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ENTOMOLOGICAL SOCIETY

OF

PHILADELPHIA.

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VOL. VI.

1866—7. .

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PHILADELPHIA:

PRINTED BY THE SOCIETY.

1866—7.



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LEPIDOPTEROLOGICAL NOTES AND DESCRIPTIONS—No. 2.

BY AUG. R. GROTE AND COLEMAN T. ROBINSON.

(Read October 9th, 1865.)

**ARCTIA**, Schrank.

***Arctia nevadensis***, n. s. (Plate 1, fig. 1, ♂.)

Anterior wings elongate, black or blackish, with broad pale yellowish bands. A longitudinal narrower stripe runs from the base of the wing to internal angle, becoming furcate immediately before the margin. This stripe is connected with the costa, immediately beyond the base, by a short transverse band, and with the internal margin, a little beyond, by a similar band. A very broad and prominent median transverse band. Subterminally, a series of broad bands resembling the letter K, with the straight stroke turned towards the base of the wing and the upper limb, not attaining external margin, at within its center, reflexed to costa before the apex. Costal edge blackish, interrupted basally and at its center by the yellowish color of the transverse bands; the subterminal bands do not extend over the costa. Fringes pale.

Posterior wings pale yellowish, with a reddish tinge which obtains principally along internal margin. An apical terminal black band, more or less continued along external margin; inside of this a few unequal spots, of which the largest is situate towards the anal angle. No discal spots. Fringes pale.

Under surface pale, reflecting the markings of the upper surface; on posterior wings there is a series of irregular black costal spots and a few black scales forming a spot on the discal cross-vein.

Head and appendages and upper thoracic region, covered with long black scales, immaculate. Beneath, the thoracic region and legs are blackish, immaculate, without any pale spots or bands. Antennæ dark brownish, densely bipectinate; the pectinations long and tapering to the tips of the antennal stalk. Abdomen similarly colored with poste-

terior wings, largely maculate with black. A broad dorsal series of black spots on the segments. A reduced lateral series of similar spots. Underneath, all the segments are neatly banded with black anteriorly.

Exp. ♂, 1.20 inch. Length of body, 0.50 inch.

*Habitat*.—Nevada. Mr. J. Akhurst.

Allied to *A. blakei*, Grote, from Colorado; the anterior wings are less produced apically, the external margin less oblique. The broader transverse bands on the anterior wings, the black caputal and thoracic parts, and the absence of median spots on the secondaries sufficiently separate this species from its congener. The habitus of *Arctia nevadensis*, recalls that of certain European species of the genus.

#### **PARORGYIA, Packard.**

With respect to the synonymy given by Dr. Packard, in his "Synopsis," of "*Parorgyia achatina*," there is an evident misconception. In the first place it is clear that Sir J. E. Smith's *Phalæna achatina* is not the species described in the "Synopsis." An examination of Abbot's figure and a comparison of the description with that given by Dr. Packard will at once show plenty of distinguishing characters. From the figure and the remark, that "the black curved line running *longitudinally* from the base towards the posterior angle of the wing is its very distinguishing character," it is plain that *Phalæna achatina* Smith, is a near ally of *P. parallela* nobis, while there are sufficient differences to allow us to consider our Eastern species as distinct from the one from Georgia. On the other hand Hübner figures "*Orgyia leucophæa*," in illustration of "*Phalæna leucophæa* Smith," but the species is certainly not Abbot's as may be seen by a comparison of the two Plates. Again, Hübner figures a species which he calls "*Dasychira vulgaris Tephra*" on the plate cited by Dr. Packard as representing "*Dasychira achatina* Hübner." This species (*Dasychira tephra*, Walk.) better corresponds to Dr. Packard's description, without, however, coinciding. Whether the species described by Dr. Packard be then *Dasychira tephra* Hübner sp. or not, we cannot decide, having no specimens; it is, however, clear to us that neither correspond with Abbot's figure. A ♂ specimen in the collection of Mr. Walsh, which we have no longer at hand, agreed with Dr. Packard's description, and has been determined by Mr. Grote as "*Parorgyia achatina* Packard." We offer, then, the following as the correct synonymy of *Phalæna achatina* Smith, a species which, with *Parorgyia leucophæa* Packard (*Dasychira leucophæa* Walk., *Phalæna leucophæa* Smith), will probably be re-discovered as soon as Southern specimens are received.

**Parorgyia achatina.***Phalæna achatina*, Smith, Lep. Ins. Ga. Vol. 2, p. 153, Pl. 77. (1797.)*Orgyia achatina*, Hübner, Verz. Schm. p. 161. (1816.)*Dasychira achatina*, Walker, C. B. M., Lep. Pt. 4, p. 865. (1855.)

" " Morris, Syn. N. A. Lep. p. 257. (1862.)

*Non alior.**Habitat.*—Georgia. (Abbot.)

The species of the genus *Parorgyia* will perhaps be found to be numerous. Their structure and the position of the genus have been well explained by Dr. Packard in his "Synopsis," and indicated by Smith, Ins. Ga. p. 155, Vol. 2.

**Parorgyia Clintonii**, n. s. (Plate 1, fig. 2 ♂, 3 ♀.)

♀. Greyish olivaceous, sparsely sprinkled with black, isolated scales. A dark basal line. Space between this line and the inner median transverse line (transverse anterior) pale brown, dotted sparsely with black scales, cinereous-olivaceous along costa. Transverse anterior line slightly oblique, faint, lost in the brown scales of the sub-basal space which precede it, but distinctly indicated, margined outwardly with pale scales, angulated below costa, below m. nervure twice very distinctly and deeply excavate. Median space cinereous-olivaceous, sparsely sprinkled with black scales, paler along costa and especially on the disc and beyond to the t. p. line where the scales are almost white. On these white scales a large reniform discal spot is indicated by a black rather indistinct encircling line and a central brownish streak. Transverse posterior line (outer median) black, broad, very distinct, nearly straight, very slightly undulate between the nervules, the most prominent projection occurring at the second m. nervule outwardly, and another, rounded inwardly, at above internal nervure. Outside the t. p. line is a wide dark brown shade band irregularly margined outwardly with whitish scales and narrowing greatly below the third m. nervule. On the interspaces, superiorly, are darker brown, longitudinal dashes; above the internal nervure is a dark brown maculate shade, broadly margined outwardly with white scales. Terminally the wing is cinereous-olivaceous as on median space. A terminal narrow black line, margined inwardly narrowly with whitish scales. Fringes dark, interrupted with pale brown at the extremity of the nervules. Secondaries evenly pale cinereous-brown. A darker shaded discal spot and subterminal band; fringes concolorous with the wing.

Under surface of both wings similar, but a little paler than secondaries above, very sparsely sprinkled with dark scales; a dark discal spot and subterminal line on both pair; on the primaries the discal spot ex-



tends diffusely upwards along the costa where the subterminal band is most plainly marked.

Head and thorax olivaceous-cinereous; abdomen darker than secondaries with metallic sub-tufts, as usual in the genus, on the second and third segments above.

Beneath, cinereous; legs clothed with long grey scales; tarsi spotted outwardly with darker scales.

♂. Much smaller than the female but resembling it in ornamentation, as is usual in this genus; the brown color on the upper surface of the primaries is less conspicuous, the olivaceous shades are brighter and all the markings are less apparent. The secondaries are darker.

Exp. ♂ 1.40, ♀ 1.80 inch. Length of body, ♂ 0.60, ♀ 0.90 inch.

*Habitat*.—Rhode Island. (Seekonk.) Coll. Mrs. S. W. Bridgham.

We name this fine species after Hon. George W. Clinton, President of the Buffalo Society of Natural Sciences, whose unwearied labors in the cause of Natural Sciences and personal kindness, merit our highest respect and affectionate regard.

*Parorgia obliquata*, n. s. (Plate I, fig. 4, ♀.)

♀. Evenly olivaceous-cinereous, very sparsely irrorate with black scales. Transverse lines pale brown. Inner median line irregularly dentate, brown. A brown discoidal streak around which the scales are faintly and irregularly paler than elsewhere. Outer median line nearly straight and even, brown, shaped much as in *P. Clintonii*, but with still less prominent inflections and succeeded by a similarly colored rather paler brown shade band, which is equally wide but rather more diffuse superiorly, where it is faintly margined with paler scales. A terminal brown line further from the margin and more irregular than in *P. Clintonii*.

Secondaries pale greyish-brown, darker than in *P. Clintonii*; a diffuse darker subterminal shade band and very faint discoloration.

Under surface slightly darker than upper surface of secondaries. On anterior wings a faint, discal, darker discoloration and a discontinued, oblique, even, subterminal, shade band. On the secondaries a discal undefined spot and a distinct, even, oblique dark band, crossing the wing from within the apex to anal angle. This band runs within and at variance with its analogue on the upper surface, as can be seen by holding the specimen to the light; its obliquity and peculiarity has suggested the specific name. On the primaries, also, the subterminal band is not produced immediately beneath the outer median line.

Head, thorax and appendages covered with mixed grey scales. Abdomen paler than secondaries.

Exp. ♀ 2.00 inches. Length of body, 0.85 inch.

*Habitat*.—Rhode Island. (Seekonk.) Coll. Mrs. S. W. Bridgham.

The more simple ornamentation of this species will quickly distinguish it from *Parorgyia Clintonii* nob. The male is unknown to us.

*Parorgyia parallela*, n. s. (Plate 1, fig. 5, ♀.)

♀. Anterior wings pale olivaceous-cinereous, much clouded with brown and sparsely sprinkled with black scales. Basally the costal half of the wing is olivaceous cinereous; the median nervure is covered narrowly along its length with black scales which are prolonged along the fourth m. nervule. Below, a broader black longitudinal stripe runs from the base of the wing to beyond the t. p. line along the sub-median fold, and is connected with the dark scales along the median nervure by an oblique black line (appearing as if covering a vein) at about its middle. This is part of the inner median line which is dentate and much as in *P. Clintonii* but less distinct. The inner median line is preceded by brown scales which stretch, beneath the median nervure, from the base of the wing across the median space centrally and on both sides of the outer median line, not extending inferiorly below the black longitudinal stripe. The discal space is covered with white scales but the outlines of the spot are indeterminate. The outer median line is distinct, black, strongly marked and, while slightly excavate and irregular, is without prominent inflections. Terminally and below the prominent longitudinal stripe the wing is covered with pale olivaceous-cinereous scales. Terminal line brown, much as in *P. obliquata* nobis. The fringes are much alike in all three species.

Secondaries pale brownish, no discal spot apparent; a neatly defined, irregular, narrow blackish band, which is further removed from the external margin than in either of the preceding species and more concise. Under surface a little darker than upper surface of secondaries, no perceptible discal spots; a common distinct dark band; on the secondaries it is wider than that on the upper surface, but covering it and entirely analogous to it.

Head and thorax cinereous; abdomen concolorous, or nearly so, with secondaries; beneath, darker, as are the legs, these latter with darker maculations on tibiae and tarsi outwardly. Under thoracic surface griseous.

Exp. ♀ 2.00 inches. Length of body, 0.95 inch.

*Habitat*.—Rhode Island. (Seckonk.) Coll. Mrs. S. W. Bridgham.

A very distinctly marked species; the dark parallel longitudinal stripes on the upper surface of primaries suggested the specific name. This species is evidently allied to *Parorgyia achatina*, but, judging from Abbot's figure, the Southern species seems sufficiently distinct.

*Parorgyia cinnamomea*, n. s. (Plate 1, fig. 6, ♀.)

♀. Brown. Basally the anterior wings are entirely dull brown. Median lines brown, shaded narrowly on either side, with pale scales. Median space superiorly covered with pale whitish scales, on which a brown reniform ringlet obscurely indicates the discal spot. Inferiorly, above internal margin, a bluish black or cinereous scale patch. Below the discal pale patch the median space is brown, paler, but nearly concolorous with the rest of the wing. The outer median brown line is projected outwardly slightly at second m. nervule and roundedly so, inwardly, at above internal nervure. Beyond the outer median line the wing is entirely brown to external margin, but the terminal half is scattered over sparsely by cinereous scales, especially at apex and internal angle; fringes dark.

Secondaries concolorous, umber brown, paler at base. Very faint traces of band and discoidal spot. Under surface more brownish than secondaries above. On anterior pair a discal spot and subterminal band are faintly indicated, the latter apparent at costa. Secondaries with hardly a trace of either, except that there appears a faint discoloration along the discal cross-vein.

Head and thorax dark umber brown; under thoracic surface and legs clothed with cinereous scales.

Exp. ♀ 1.40 to 1.80 inch. Length of body, 0.75 inch.

♂. Resembles the ♀ in ornamentation. Wings full, rounded. Primaries above more cinereous; the brown shades are duller than in the ♀. On the under surface of the secondaries the subterminal band is more distinctly marked.

Many specimens examined.

Exp. ♂ 1.50 inch. Length of body 0.75 inch.

*Habitat*.—Rhode Island. (Seckonk.) Coll. Mrs. S. W. Bridgham.

A smaller species than its congeners and easily known by its rich brown, nearly concolorous primaries.

*Dasychira clandestina* Walker, from Bevins Lake, B. Am., and *Dasychira rossii* Curtis, from Arctic America, seem quite distinct from any of the above species, though probably belonging to the genus *Parorgyia*.

**ADELOCEPHALA**, Boisd.

*Adelocephala albolineata*, n. s. (Plate 1, fig. 7, ♂.)

Primaries bright yellow finely mixed with dark scales and crossed by two distinct white lines. The first of these runs from costa, above the discal cell, inwardly obliquely to submedian nervure, whence it is rounded to extreme base of the wing, nowhere touching internal margin. A white spot at the lower extremity of the discal cell. The second white stripe runs inwardly very obliquely from the apex to internal margin, which latter it joins at within its middle, at a point beneath the inner extremity of the discal cell. External and internal margin bordered with white scales.

Secondaries of a deep pink, of a more intense color on the disc and along the basal half of internal margin, which parts are covered with longer scales than the rest of the wing. A black discal spot. A continued, white, subterminal stripe, which does not run parallel with the external margin of the wing, since it emanates at the apex and joins internal margin much within anal angle. Costal and external margins of a dull whitish shade.

Under surface very pale, dull whitish, with a pink tinge, which is very faint and evenly spread over the secondaries, but is brighter over the primaries centrally, deepening especially on the disc where the squamation is concolorous with upper surface of secondaries. On the primaries, below the costa, centrally, are scattered bright orange-yellow scales; a distinct black discal spot; the outer oblique white stripe of the upper surface is here faintly reproduced. On the secondaries a dark brown discal spot; the subterminal white band of the upper surface is here distinctly reproduced. Thorax, above, concolorous with upper surface of primaries, bright yellow; a whitish stripe along the inner margin of the tegulæ. Head, much sunk beneath the elevated prothoracic pieces, which render it invisible from above. Abdomen, yellow dorsally; laterally and beneath, with under thoracic surface, of a dull whitish pink tinge somewhat darker than the under surface of the wings.

Exp. ♂ 2.50 inches. Length of body, 1.15 inch.

*Habitat*.—Mexico. Coll. Ent. Soc. Phila.

The individual of this species, that we have before us, is deprived of its antennæ. The species is very distinct from our more Northern *Adelocephala bicolor* Grote, (*Dryocampa bicolor* Harris,) and may be readily distinguished by its white lines, which are unusual. *Sphingicampa distigma* Walsh, and *Dryocampa bicolor* Walsh, are identical

and apparently simple synonyms of *Adelocephala bicolor*, as already stated by Mr. Grote; their description by Mr. Walsh as distinct species, is attributable to an error of observation.

**DATANA, Walker.**

The species belonging to this genus have hitherto been insufficiently separated. They will be found here described and figured and descriptions of the mature larva, from alcoholic specimens, given of each species, with the exceptions of *Datana major*, sp. nov. and *Datana perspicua* G. & R. We have had before us, from different localities, about one hundred specimens, all of which we have been able to refer to one or another of the four species: *Datana angusii*, sp. nov. *Datana ministra* Walker, (*Drury* sp.,) *Datana integerrima*, sp. nov., and *Datana contracta* Walk.

The characters which are held in common by the species of *Datana*, are, in part, as follows: The scales which clothe the head and which form a thoracic patch extending over the prothorax above, on the central disc and over the base of the tegulæ, are dark and intense in coloration, deepening to the raised edges on the thoracic parts. Five transverse lines cross the anterior wings from costa to internal margin. Of these the fourth is least conspicuous and contiguous to the fifth. Usually, in the males, the under surface of the wings is crossed by a dark shade band. The fore femora, tibiæ and tarsi are darker colored than the rest. It is difficult to attach specific value to the course of the transverse lines, since it is exposed to considerable variation in the same species. Briefly, the distinctions between the species, all of which are of different shades of yellow or reddish brown, are these: In *D. angusii*, *D. ministra*, and *D. major*, the external margin is excavate between the nervules. This character excludes *D. integerrima*, *D. contracta* and *D. perspicua* from present consideration. The general deep brown color, which has something of a blackish-purple tinge, will at once separate *D. angusii* from its associates. *D. ministra* and *D. major* are nearly related, the latter may be distinguished by its larger size, the more tawny general coloration, the less prominently excavate external margin of the anterior wings, while the secondaries are, in the specimen we have before us, uncrossed by any pale shade. *Drury's* and *Harris' figures* represent most decidedly the species we describe as *Datana ministra*. The moderate size, excavate primaries and intense reddish-brown coloration are distinguishing characters.

The three species belonging to the second section of the genus are

alike characterized by their entire non-excavate primaries. Of these, *D. integerrima* sp. nov. is, perhaps, our commonest species, and while generally mistaken for *D. ministra*, may be distinguished by the character of its section. The transverse lines are accompanied by paler shades and the median pale shade on the secondaries is broader than in *D. ministra*. The general coloration is duller, more brownish, the irrorations fine and aggregated. *Datana contracta* is more yellow and tawny than *D. integerrima*, the irrorations are more conspicuous than in any other species. From Walker's expressions we feel confident that we have interpreted his description correctly, though not having made any comparisons with his types, absolute certainty cannot be attained in the matter of such closely allied species. The frontal and thoracic patch is quite tawny while the insect is smaller than *D. integerrima* and the anterior wings are narrower. *Datana perspicua* is nearly allied to *D. contracta* in color, but is more luteous; the irrorations are obsolete; the secondaries sub-diaphanous, immaculate, without any shade, the dark fringes contrasting forcibly with the general color on both wings. Through the kindness of Mr. James Angus of West Farms, N. Y., who has bred *D. ministra*, *D. angusii*, *D. integerrima* and *D. contracta* in many coincident individuals we are indebted for alcoholic specimens of the larvæ of each of these species. The observations of this gentleman are confirmatory of our views that these species are distinct, since he has reared them all for several seasons and found them faithful to their several types, with unimportant imaginal variations. The sexes of all the species resemble each other, so far as observed.

† *Anterior wings excavate along external margin.*

*Datana angusii*, nov. sp. (Plate 2, fig. 1. ♀.)

Smoky brown. Anterior wings excavate between the nervules along the external margin, blackish brown, with a brighter shade along the costa centrally and above the apical streak. Sparsely and irregularly irrorate with scattered black scales. Five transverse blackish lines run from costa to internal margin. Of these, the first is slightly arcuate. A central discal dot. The second transverse line angulate below costa, running inversely obliquely to internal margin from the disc. This line either intersects or runs inside of the second discal spot, which is formed by an aggregation of darker scales on the discal cross-vein. Third and fourth transverse lines parallel, very slightly arcuate or oblique, faint, especially the fourth, which is quite contiguous to the fifth, and last, transverse line. This latter is very

distinct, and slightly irregular and arcuate. There are no paler marginal shades to any of the lines. Apical streak prominent. Fringes dark brown.

Posterior wings entire, dark brown, of the same general shade with the anterior wings, gradually shading to paler to the base. A linear median paler central shade, defined inwardly with darker scales.

Under surface dark brown. The anterior wings darkest, the coloration becoming more intense towards the internal margin on both pairs.

The scales which clothe the head, and those which form the dark thoracic patch, which is characteristic of the genus, are of an intense dark purplish-brown color, narrowly deepening to blackish at the edges.

Meta-thoracic and lateral scales concolorous with anterior wings at base.

Abdomen above, pale brownish, with a slight testaceous tinge deepening in color to anal segments; beneath, darker.

Antennæ brownish, paler on their inner surface.

Legs pale brownish; anterior tarsi and femora clothed with darker scales on their upper surface.

Exp. ♂ and ♀ 1.80 to 2.20 inches. Length of body, 0.85 inch.

*Habitat*.—West Farms, N. Y., (J. Angus.) Long Island, (F. & J. Tepper.) Seekonk, R. I., (Mrs. S. W. Bridgham.) West Virginia, (Edwards.)

*Mature larva*.—Head black, shining. Body smooth, purplish-black, clothed with long whitish hair, arranged more densely on the segments latterly, sparse and irregular dorsally. Four pale yellow lines on each side, the lower obsolete centrally above the abdominal legs. The dorsal, swelled portion of the prothoracic ring is black behind, but yellowish immediately adjoining the head. A longitudinal, ventral, yellowish line. Beneath, the segments bearing thoracic legs are purplish-black, concolorous with their upper surface. Abdominal legs flesh-color; thoracic legs blackish. Feeds on species of Walnut, (*Juglandis*.) Enters the ground towards end of August and beginning of September. (Auth. Angus.)

We have examined numerous male and female specimens of this species, which is readily distinguished from all others of the genus by its peculiar smoky brown coloration. We have named it after Mr. James Angus, whose valuable material has been of service to us in limiting the species of this genus.

Coll. Ent. Soc., Philadelphia.

**Datana ministra**, Walker. (Plate 2, fig. 2, ♀.)*Phalena ministra*, Drury, Exot. Lep., Vol. 2, p. 25, Pl. 14, fig. 3. (1773.)*Phalena ministra*, Smith, Insects Ga. p. 161, Pl. 81. (1797.)*Pygæra ? ministra*, Harris, Cat. Ins. Mass., p. 73. (1835.)*Patasa ministra*, Westw. Edit. Drury, II, p. 27, Pl. 14. (1837.)*Pygæra ? ministra*, Harris, Rep. Ins. Mass., p. 312. (1841.)*Pygæra ? ministra*, Harr. Rep. Ins. Mass., 3d ed., p. 430, Pl. 6, fig. 6. (1863.)*Datana ministra*, Walker, Cat. Lep. Brit. Mus., Par. V., p. 1061. (1855.)*Datana ministra*, Morris, Synopsis, p. 247. (1862.)*Datana ministra*, Packard, Proc. Ent. Soc. Phil., p. 354. (1864.)

Bright reddish-brown. Anterior wings excavate between the nervules along the external margin. Reddish-brown, with a brighter, tawny shade extending along the costa centrally, and above the apical streak; the rest of the wing shows a faint purplish reflection. Evenly and sparsely irrorate with dark-brown scales. Five transverse, dark-brown lines. The first prominently arcuate. A central discal dot. The second line angulated beyond the disc, thence running inversely obliquely to internal margin, usually outside the darker scales which clothe the discal cross-vein. The third runs parallel with the second. The fourth fainter, contiguous to the fifth, which latter is very distinct and slightly irregular. The position of these lines is slightly variable, the second and third being, sometimes, hardly angulated below the costa; or the second running inside the outer discal spot. Apical streak varying in prominence. Fringes brownish.

Posterior wings entire, pale reddish-brown, shading to paler towards the base and crossed by a faint median shade.

Under surface pale reddish-brown, darker on the anterior wings and usually deepening towards external margin on both pairs.

The scales which clothe the head and form the dark thoracic patch, are of a deep tawny-brown shading to darker along the edges on the thorax, where they acquire a purple tinge. Metathoracic and lateral scales concolorous with anterior wings at base. Abdomen above, pale reddish-brown with a testaceous tinge, deepening in color at anal segment. Antennæ tawny-brown, paler on their inner surface.

Exp. ♂ and ♀, 1.70 to 2.20 inches. Length of body, 0.85 inch.

*Habitat*.—West Farms, N. Y., (Mr. J. Angus.) Long Island, N. Y., (Harvey J. Rich.) Massachusetts, (Dr. A. S. Packard, Jr.)

*Mature larva*.—Head, black, shining. Body smooth, blackish, clothed with sparse, testaceous whitish hair. Four dark-yellow lines, very prominent, on each side of the body, a fifth (absent in *D. Angusii*) is interrupted centrally on the segments by the legs and pedal warts. A ventral longitudinal line beneath. The segments which



bear the thoracic legs are testaceous beneath. Supra-anal plate black. The swelled portion of the prothoracic ring, dorsally, is entirely orange-yellow. Food plants: Apple, cherry, etc. (Rosaceæ.) (Auth. Angus.)

Coll. Ent. Soc., Philadelphia.

*Datana major*, sp. nov. (Pl. 2, fig. 3, ♀.)

Size large; form, stout. Of a uniform tawny reddish-brown. Anterior wings broad, slightly excavate between the nervules along external margin; pale reddish-brown, with a brighter, more tawny shade along costa centrally and above apical streak; partially and distinctly irrorate with brown scales which do not extend over the superior bright shade. Five transverse brown lines. The first conspicuously arcuate. A dark median discal dot. Discal cross-vein largely covered with dark scales. The second line obsolete on costa, angulated beyond the disc, thence running inversely oblique to internal margin. The third line prominent, running parallel to the second. The fourth faint, contiguous to fifth, which latter is distinct and slightly arcuate. Apical streak, obsolete superiorly; fringes dark.

Posterior wings pale reddish-brown, nearly concolorous with anterior wings, becoming paler at base, with no traces of a median shade.

Under surface paler than upper, immaculate; fringes darker.

The scales which clothe the head and form the dark thoracic patch, are tawny-brown, deepening in color towards the edges on the thorax; metathoracic and lateral hairs, concolorous with anterior wings at base. Abdomen, pale reddish-brown, with a testaceous tinge.

Exp. ♀, 2.10 inches. Length of body, 2.20 inches.

*Habitat*.—Maryland, (R. Stratton.) Coll. Ent. Soc. Philadelphia.

By a parity of reasoning this stouter species with broader wings and modified ornamentation, may be regarded as distinct from its congeners, though we have but a single specimen before us.

†† *Anterior wings entire*.

*Datana integerrima*, sp. n. (Plate 2, fig. 4, ♀.)

Dark reddish-brown. Anterior wings entire along external margin, thickly and evenly covered with fine scattered irrorations, with a bright shade extending along costa centrally and above apical streak. Five transverse dark-brown lines. The first moderately arcuate, margined within by a paler shade. A central discal dot. The space between the first and second transverse lines darker. The second line covers the outer discal dot and is margined outwardly by paler scales, as are the third, fourth and fifth lines. The position of all these lines is

subject to variation. The fourth is, as usual, fainter than the rest and very contiguous to the fifth.

Posterior wings very pale, crossed by a rather broad, pale, median shade. Under surface paler than upper, deepening in color towards external margin; fringes dark.

The scales which clothe the head and form the thoracic patch, are dark tawny-brown, deepening in color towards the edges of the thorax. The metathoracic and lateral hairs are very pale. Abdomen pale, testaceous; anal segment concolorous with the rest.

Exp. ♂ and ♀, 1.80 to 2.30 inches. Length of body, 0.78 to 1.10 inch.

*Habitat*.—West Farms, N. Y., (Mr. J. Angus.) Long Island, N. Y., (Messrs. H. J. Rich and E. L. Graef.)? Seekonk, R. I., (Mrs. S. W. Bridgham.)

*Mature Larva*.—Entirely purplish-black, immaculate, thickly clothed with long whitish hair, which arises in spreading fascicles laterally on the segments above the legs and more sparsely dorsally. The larva before the last moult is striped like that of *D. ministra*, with the immature stages of which it has not been compared. The entirely different coloration and shaggy appearance after its last moult, are very characteristic and anomalous. It has been found on apple-trees etc., like *D. ministra*. Enters the ground in September; the imago appears from the middle to the end of July. (Auth. Angus.)

*Datana integerrima* is our commonest species and generally resembles *Datana ministra*, from which it may be distinguished by the non-excavate external margin of the anterior wings, its general paler and duller color and in that the transverse lines are accompanied usually by paler marginal shades.

*Datana ministra*, Fitch, 1st Rep. Plate 4, fig. 3, is not Drury's species, from which it may be distinguished by its descriptive non-excavate external margin of the primaries. The larva does not correspond with either that of *D. integerrima* or of *D. contracta*, and it is not impossible that it is a hitherto unrecognized and separate species. An imago sent us from Albany strengthens this opinion since it agrees with Dr. Fitch's figure and differs from *D. integerrima* in its brighter color, the transverse lines not followed by paler shades. A second species with entire primaries, of a paler color than *D. integerrima*, and with a different larva may have to be separated as distinct. To provide for this we have described as *D. integerrima* the specimens received from Mr. Angus and associated with the larva.

**Datana contracta**, Walker. (Pl. 2, fig. 5 ♂, 6 ♀, var.)

*Datana contracta*, Walker, Cat. B. M. Part. 5, p. 1062. (1855.)

*Datana contracta*, Morris, Syn. Lep. N. A., p. 247. (1862.)

*Datana contracta*, Packard, Proc. Ent. Soc. Phil., Vol. 4, p. 355. (1864.)

Luteous tawny. Anterior wings entire with a brighter shade extending along the costa centrally, and above the apical streak. Profusely and distinctly irrorate with dark-brown scales. Five transverse brown lines. The first oblique, very slightly arcuate, and margined inwardly with lighter scales. A central discal dot. The second line curved outwardly at costa, thence running inversely obliquely to internal margin. This line, which is margined outwardly with paler scales, joins the first at internal margin in a single specimen before us. A second discal spot. The third line slightly arcuate at costa, thence running parallel with fourth and fifth lines to internal margin. The third and fifth distinctly margined outwardly with paler scales. The fourth, which is quite contiguous to the fifth, is indistinct, and, in some instances, almost obsolete. Apical streak obsolete superiorly, indistinct. Fringes bright reddish-brown, the same with the thoracic patch.

Posterior wings very pale, with a paler median shade.

Under surface paler than upper, shading to reddish-brown towards external margin on anterior wings.

The scales which clothe the head and form the thoracic patch, are bright tawny-brown becoming darker towards the edges on the thorax.

Metathoracic and lateral hairs concolorous with posterior wings.

Abdomen pale tawny; anal segment darker.

Exp. ♂ and ♀ 1.85 inch. Length of body, 0.70 inch.

*Habitat*.—West Farms, N. Y., (Mr. James Angus). New Jersey; Rhode Island; Long Island, (Mr. Harvey J. Rich.)

*Mature larva*.—Head black, shining. Body, black, with four lateral broad yellowish-white stripes, a fifth is interrupted centrally by the legs as in *D. ministra*, but in this latter species the stripes are darker and slightly narrow while the larva is larger than that of *D. contracta*. The body is clothed with longer hair and is of a deeper black than in *D. ministra*. The dorsal swelled portion of the prothoracic ring is similarly colored but less prominent and exerted than in its congener.

Food Plants: Species of oak (*Quercus*) on which alone this caterpillar has been hitherto collected. (Auth. Mr. James Angus.)

**Datana perspicua**, Grote & Robinson.

*Datana perspicua*, G. & R., Proc. Ent. Soc. Phila., IV., p. 489, Pl. 3, fig. 1. (1865.)

This species is characterised by its clear yellow color; the transverse lines on the narrow anterior wings are not bordered with paler shades, and are more crowded together, leaving the terminal space wider than usual. The irrorations are obsolete. The posterior wings are very pale stramineous testaceous, immaculate, without any median line or shades. The dark fringes contrast forcibly with the pale squamation of the wings.

*Habitat*.—Chicago, Ill., (Mr. A. Bolter.) Larva, unknown.

In connection with the specimens and larva here described, Mr. James Angus writes: "As near as I can remember, the larvæ of all the four species are so much alike previous to the last moulting, that it would be difficult to distinguish the one from the other. They are then all lined and the lines, if I remember right, are all about the same color, which is light purple. I intend however, if I live, to watch them more minutely another season and I will give you the result of my observations. The specimens of the imago sent you are all of the ordinary size and the peculiar characters of each are so constantly uniform that I could scarcely detect any differences between the specimens I have of each species except in size."

In conclusion we state, that a number of the perfect individuals we have here used and the alcoholic specimens of the mature larvæ, are deposited in the Collection of the Entomological Society of Philadelphia, the attention of American lepidopterists is called to the further investigation of the species of this interesting genus.

**CÆLODASYs, Packard.**

*Cœlodasy's apicalis*, n. sp. (Plate 2, fig. 7, ♂.)

Anterior wings rather blunt and short; apices more produced than usual in the genus. Light brown shaded with whitish cinereous. Basal space light brown, almost concolorous. A narrow linear black streak runs, below the m. nervure and parallel to it, from base of the wing to the first transverse median line; this latter obsoletely geminate, with a preceding or internal whitish cinereous shade, dark brown, dentate on costa, thence irregularly undulate to internal margin. A whitish cinereous costal shade extends over the disc to the black luniform discal mark, which is very distinctly defined. Median space below the disc, pale brownish, of a rather lighter shade than elsewhere. Outer transverse line obsoletely geminate, with an internal whitish shade, projected beyond the disc, irregularly dentate and undulate. The nervules are narrowly and more or less continuously covered with black scales. Terminally the wing is pale brown, with darker, short,

interspaceal dashes and with a whitish cinereous shade which obtains principally over the apex. Fringes somewhat testaceous, dark at the extremity of the nervules. Posterior wings whitish, with an arcuate, median, paler band defined by its margins. Anal angle stained with blackish; this color extending on the fringes at this place which elsewhere are whitish. The wings are powdered with brownish scales especially along the costa. Beneath: the primaries are generally dark without definite markings, largely whitish along internal margin; costa powdered with pale cinereous scales; a subterminal, transverse, pale, shade band. Secondaries, whitish, with scattered brownish scales along costa; anal angle stained with blackish as on upper surface.

Head and thoracic appendages clothed with pale mixed brown and cinereous scales. Patagia, narrowly edged behind with dark scales; metathoracic hairs, dark. Abdomen, whitish cinereous; on basal segment above, a few dark scales; terminal segment clothed with darker scales and furnished with a bifid anal tuft. Legs and under thoracic surface clothed with obscure purplish-brown scale.

Exp. ♂ 1.20 inch. Length of body 0.60 inch.

*Habitat*.—Eastern States.

Size of *C. unicornis*, Pack.; the apices of anterior wings are more produced, costal nervules more curved, while the general coloration and ornamentation will quickly distinguish this species from its associates.

#### **ACRONYCTA**, Ochsenheimer.

*Acronycta occidentalis*, n. sp.

This species is the American analogue of the European *Acronycta psi*. It constantly differs from its ally by the paler color of the primaries, which are more sparsely covered with scales, and their somewhat squarer shape. The reniform spot on the disc shows a bright testaceous tinge, and the ordinary spots are less approximate than in *A. psi*. The secondaries are dark grey, nearly unicolorous, a little paler in the male, and darker in either sex than in its European analogue.

Exp. ♂ and ♀, 1.40 inch. Length of body, ♂ 0.60, ♀ 0.70 inch.

*Habitat*.—Eastern and Middle States. Of common occurrence from May to July. Coll. Ent. Soc. Phil.

This species is doubtfully regarded as identical with the European *A. psi* by Messrs. Guenée & Walker in their respective works on our Noctuidæ. The larval stages of our species have not been described to our knowledge. This species has occurred quite plentifully to Mr. Grote on the trunks of the elm trees in Boston Common.

***Aeronyeta funeralis*, n. sp.** (Plate 4, fig. 10, ♂.)

Form of *A. occidentalis*; the primaries are narrower, their apices more produced. Pale bright grey; along internal margin a broad blackish shade, which spreads from base to t. p. line and diffusedly from the sagittate marks which are characteristic of the genus, but which in this species are evidently broader than usual, being about thrice broader than in *A. occidentalis*. The ordinary spots are somewhat larger and wider apart, the median space narrower, the geminate transverse lines more approximate, the terminal spaces wider than in *A. occidentalis*. The upper black streak beyond the disc is entirely obsolete. Fringes, whitish, neatly and narrowly interrupted with black between the nervules. Secondaries whitish, semi-diaphanous, with a diffuse dark marginal shade, which is broadest at and below apical angle; nervules covered with dark scales. Fringes white, narrowly and neatly interrupted with black between the nervules. Under surface of primaries mostly pale blackish with a sub-testaceous tinge, largely whitish along internal margin to the transverse subterminal line. Secondaries whitish; a distinct blackish discal spot, a nervular interrupted band and diffuse terminal shade. A costal, diffuse, dark spot within the discal one. Head, above, whitish; palpi whitish, with the second joints black on the outside. A lateral black shade extending along the outer margins of the tegulæ. Prothorax, thorax and patagia, pale grey. Abdomen darker than thorax; beneath, white; anus fringed beneath with black hairs. Legs, whitish; tarsi annulate with black; anterior tibiæ blackish on their inner surface.

Exp. ♀ 1.50 inch, Length of body, 0.70 inch.

*Habûat*.—Ohio. (Mr. Pettingill.)

**MAMESTRA**, Ochs.***Mamestra Bridghamii*, n. s.** (Plate 3, fig. 1, ♂.)

Anterior wings pale grey with a bluish tinge; median space reddish-brown, shaded with dark yellowish-olivaceous. Basal half-line whitish with an internal marginal line; sub-basal space dark, sparsely shaded with bluish grey scales. Transverse anterior line undulate, of a darker shade than the median space, preceded by a coincident line of whitish scales. Median space dark reddish-brown, below the disc mostly covered with olivaceous scales. All the veins marked with greyish scales interrupted by darker ones. A neatly defined reddish-brown median shade line runs from costa to internal margin, angulated at the median nervure. Orbicular and reniform spots yellowish-grey, of the normal shape. Transverse posterior line similar to the transverse anterior

line, arcuated superiorly to third median nervule. Subterminal space clear bluish-grey, Costa blackish with four white pre-apical dots, the first of which surmounts the reniform spot. Subterminal line yellowish-grey, preceded by olivaceous scales. Terminal space pale bluish-grey, discolored by brownish scales above the internal angle, and again at about first median nervule below the apex. Fringes grey irregularly sprinkled with darker scales at the extremity of the interspaces.

Posterior wings very pale whitish-grey, with two terminal parallel darker shade bands, of which the inner is sub-obsolete. A narrow terminal black line discontinued before anal angle. Fringes whitish.

Under surface very pale greyish, shaded with vinous or violaceous scales. Anterior wings with grey scales along the costa. Two subterminal vinous shade bands, which are continued on the secondaries to before the anal angle. The posterior wings are whitish, sprinkled with vinous scales along the costa.

Head and thorax clothed with grey scales; on the tegulæ these are whitish with a faint internal line. Disc of the thorax with a few olivaceous brown scales, which form the central thoracic tuft. Meta-thoracic tuft formed of whitish scales. Abdomen whitish-grey, darker beneath, with two dorsal brown tufts on the third and fourth segments above. Legs and under-thoracic parts grey; tarsi annulated; posterior and middle tibiæ with whitish scales on their inner surface.

Exp. ♂ 1.30 inch. Length of body 0.70 inch.

*Habitat*.—Rhode Island. (Mrs. S. W. Bridgham.)

Several coincident specimens examined. Allied to *Mamestra arctica*, Boisd. (*Hadena amputatrix*, Fitch), but a much smaller and paler species. The whitish body and posterior wings, the olivaceous scales on the median space of the anterior wings, are features which will readily distinguish the present species from its congener.

Respectfully dedicated to Mrs. S. W. Bridgham, whose collection of North American Lepidoptera contains many rarities, owing to the praiseworthy zeal displayed in augmenting it.

#### **XYLOPHASIA**, Stephens.

***Xylophasia vulgaris***, sp. nov. (Plate 3, fig. 2, ♂.)

Dull brown. Transverse lines broken; nervules clothed with uninterrupted darker scales. A narrow basal sub-median dark streak. Transverse anterior line geminate, acutely dentate; below the internal nervure the inner line is broadly marked, running back nearly to the base of the wing. Costally the wing is brighter colored. Reniform and orbicular spots underneath, encircled by brown annuli more or less

broken and indistinct. Transverse posterior line much broken and incomplete, plainly marked on costa (as are all the transverse lines) forming a geminate series of dark dots on the veins. Below third m. nervule a pale lunulate mark, behind which a prominent dark dash. Interspaces with central brown shade streaks and dashes. Subterminal line, faint, broken, incomplete. Terminally, opposite the disc, a blackish shade, and another, extending inwardly to t. p. line, above internal nervure.

Posterior wings silky brown, immaculate, with pale, testaceous fringes, which show an irregular, prominent, dark median line discontinued before anal angle. Under surface of anterior wings dark testaceous, irrorate with dark scales; a dark discoloration along discal cross-vein; a subterminal, waved dark transverse line, geminate on costa; three costal pale dots; fringes dark. Posterior wings paler than primaries, a distinct discal dark dot and two subterminal dark lines of which the inner is most distinct.

Head and thoracic region above concolorous with upper surface of primaries; clypeus, pale; below the frontal tuft a dark line extending across the front; tegulæ lined with distinct dark scales, broadly marked inwardly. Abdomen above darker, but nearly concolorous with secondaries above; the male anal tufts, testaceous and sub-fulvous. A dark lateral interrupted sub-anal line. Beneath, with thoracic region, paler. Female, brighter colored.

Exp. ♂ 1.65 inch. Length of body 0.80 inch.

*Habitat*.—Middle States. Coll. Ent. Soc. Phil.

A duller and smaller species than *X. apamiformis*, Guén. Mr. Walker, to whom a specimen was sent, regarded it as allied to the European *X. polyodon*, with which we are presently unacquainted.

#### ANTHÆCIA, Boisd.

*Anthæcia hirtella*, n. s. (Plate 3, fig. 3, ♂.)

Anterior wings olivaceous-brown; median space densely covered with pale grey scales; median lines well defined. Basal and subterminal spaces olivaceous-brown; basal half-line whitish. Median lines distinct, faintly geminate, the transverse anterior dentate below costa, slightly angulate at the median nervure, thence inwardly obliquely rounded to internal margin. Transverse posterior line sinuate, slightly trembled superiorly, approaching the transverse anterior line below the disc. Median space thickly covered with whitish-grey scales inferiorly, tinged with ochreous-brown on the disc before the reniform spot, which latter is shaded centrally with greyish scales. Subterminal space olivaceous,



brownish, concolorous with the basal spaces. Subterminal line greyish-slightly irregular, continued. Terminal space narrow, rather darker than subterminal space. Fringes dark, concolorous.

Posterior wings very pale yellow, covered with blackish scales at extreme base and along internal margin. A free, broad, black, sublunifform discal spot. A broad, black terminal band, sinuate along its inner margin. Fringes pale, long and whitish along internal margin, partially obscuring the black scales.

Under surface pale testaceous-whitish. A blackish longitudinal basal streak; two distinct, black discal spots; a subterminal sinuate blackish band furcate on costa; apex tinged with reddish scales. This description applies equally to both anterior and posterior wings.

Head, thorax and their appendages, clothed with mixed brownish scales; abdomen, paler, closely scaled; under-thoracic and abdominal surfaces, pale testaceous.

Exp. ♂ 0.80 inch. Length of body 0.40 inch.

*Habitat*.—Rhode Island.

This species resembles *A. marginata* Grote, *A. arcigera* Guenée, and *A. Spraguei* Grote, in the distinctness of the median lines on anterior wings; their conformation, the grey median space and the very pale yellow of the secondaries, distinguish this more hirsute species from its congeners.

#### **AEDIA**, Hübner.

*Aedia nigrescens*, n. s. (Plate 3, fig. 4, ♀.)

Anterior wings dark cinereous shaded with blackish. Basal and sub-basal spaces evenly dark cinereous; basal half-line black, succeeded by a faint coincident linear mark. Transverse anterior line oblique, slightly irregular, preceded by a faint coincident line. Beyond the t. a. line, is a broad, oblique, dull, brown band, margined outwardly by an oblique, dark, median, shaded linear band, widening to internal margin where it is limited outwardly by the t. p. line. This latter is shaped as usual in the genus, surrounding outwardly the extra discal spot, which is large, pale, with a prominent tooth outwardly directed. The t. p. line is broken superiorly where it is strongest marked, being more faintly indicated before internal margin. Subterminal space dark blackish, deepening in hue towards the subterminal line, which latter is even, a little waved, with a single inward prominent inflection opposite the discal cell, from whence a darker shade line runs to internal margin at the angle. Terminal space clear pale cinereous; a black apical mark; a terminal, dark, neatly dentate line, continued from apex to internal angle.

Posterior wings almost wholly blackish; a median testaceous-whitish shade; base covered with dull, pale blackish scales. Fringes, white, interrupted centrally with black, where a pale shade intrudes on the black terminal scales. Beneath, very pale, with broad black terminal bands; on the primaries an oblique black band crosses the disc and joins the terminal band on internal margin before the angle. On the secondaries a neat black discal dot.

Head, and thoracic region above, very dark cinereous. Palpi prominent; apical joints long; basal joints pale, whitish. Abdomen, dull brownish, paler than the thorax. Beneath, the thoracic and abdominal regions are pale and whitish. Legs, pale, darker on their outer surfaces.

Exp. ♀ 1.90 inch. Length of body 0.90 inch.

*Habitat*.—Texas, (E. T. Cresson.) Coll. Ent. Soc. Phil.

Size of *Aedia fuscicularis* Hübner, but a broader winged species and with different coloration of primaries above. There is no fascicle of hair on the middle legs, the specimen being evidently a female; while this character is given by M. Guenée as specific when describing Hübner's species, it may, however, be of generic value. The antennæ are defective in the specimen but appear to be filiform. We retain for this genus the term used by Hübner in the "Zutræge."

*Aedia pallescens*, n. s. (Plate 3, fig. 5, ♀.)

Anterior wings cinereous. Basal spaces pale ochreous with a reddish tinge; a dark basal half-line. Transverse anterior line black, indistinctly geminate, since it is preceded by a paler coincident shade line which is plainly separated on costa, below which it spreads and becomes fused with the dark line. This latter is even, with a prominent obtuse angulation below the median nervure. Median space distinctly yellowish-ochraceous, crossed by two waved, darker, median shade lines, cinereous on costa except before the t. a. line where it is colored as inferiorly. The transverse anterior line is in fact followed by a discolorous oblique band, which is here yellowish-ochraceous, as in *Aedia nigrescens*, where it is brown. The extra discal spot is very pale. Transverse posterior line black, shaped as usual in the genus, with two outward angulations corresponding to the shape of the extra discal spot. Subterminal space cinereous, shading outwardly to paler. Subterminal line, faint, preceded superiorly by interspaceal black marks and indicated by pale succeeding scales; terminal line, obsolete.

Secondaries, much as in *Aedia nigrescens*, but the pale, semi-transparent shade extends over the base of the wing, leaving some pale

blackish scales along internal margin. Under surface of both pair resembling that of the preceding species; on the secondaries the discal dot is obsolete.

Head, thorax and appendages above, colored like the basal space of primaries, being of a dull pale reddish hue. Palpi, improminent, third joint small, thus differing from the preceding species in which the palpi are prominent, held free from the head with an elongated apical joint. Abdomen dull brownish-testaceous; beneath, with thoracic region, whitish-testaceous. Antennæ, filiform.

Exp. ♀ 1.50 inch. Length of body 0.70 inch.

*Habitat*.—Texas, (E. T. Cresson.) Coll. Ent. Soc. Phil.

#### **CATOCALA**, Ochs.

*Catocala badia*, n. s. (Plate 4, fig. 1, ♂.)

Bright brown, mixed with ashen scales. Anterior wings brown. Basal half line, brown. Basal space and basal half of sub-basal space, pale brown mixed with ashen scales. A broad, brown, transverse shade precedes the transverse anterior line, which latter is brown, slightly undulate and oblique, most prominently produced on the interspace between the median and internal nervures. Median space narrow, pale brown, sprinkled with ashen scales. Reniform spot brown, ill defined, sub-obsolete, obscured and nearly lost in the ground color of the wing; sub-reniform, wanting. Transverse posterior line faint, brown, obscured by a very broad, straight, brown, transverse shade, which covers the wing at this place and is sharply defined externally. The t. p. line may be detected at within the middle of this shade which encroaches on the median space superiorly; it will then be seen to be without prominent teeth, somewhat squarely and angularly produced superiorly, provided with a faint minute tooth on the interspace above the first median nervule. From the point of anastomosis of the second and third median nervules to the internal margin, the t. p. line is straight, faint and but slightly undulate on the interspaces. The scales bordering the broad brown posterior shade are very pale and sharply contrasted, deepening in color towards external margin. Faint traces of a brown subterminal line; the nervules clothed with ashen scales. A terminal series of small interspaceal brown spots; fringes dark.

Posterior wings bright orange-yellow; base and internal margin, clothed with long dust-colored hair. A median black band, somewhat irregular, nowhere prominently constricted, hardly attaining the internal margin. A broader terminal black band, quite irregularly margined inwardly, nowhere prominently constricted and expiring just

before the anal angle. A narrow terminal orange-yellow space, broadest below costal angle, beyond, encroached upon by the black terminal band; fringes dark. Under surface, dark yellow. Terminally, both wings are covered with pale brown scales. On anterior wings, median and basal black shade bands. On posterior wings the terminal brown band becomes narrow and blackish toward anal angle, sparsely dilated along costa. A median, black, irregular, shade band. Head, thorax and appendages, pale brown mixed with ashen scales. Abdomen dull testaceous. Under thoracic surface and legs very pale brownish.

Exp. ♂ and ♀, 2.00 to 2.20 inches. Length of body, 1.10 inch.

*Habitat*.—Atlantic District. Common. Coll. Ent. Soc. Philad.

Numerous coincident specimens from Massachusetts, Rhode Island, New York and Pennsylvania examined.

Very distinct from any hitherto described species, and aberrant in its style of ornamentation. It appears to be allied to the Japanese *C. obliterata*, Ménétriés.

*Catocala ponderosa*, n. s. (Plate 4, fig. 2, ♀.)

Pale greyish cream-color, much shaded with deep brown; transverse lines black. Basal half-line, black; extreme base blackish brown superiorly, inferiorly clothed with long dust-colored hair. Sub-basal space blackish-brown, inferiorly mixed with greyish scales. Transverse anterior line black, broadly dilated on costa, with a slight sub-costal tooth, nearly even, improminently and roundedly exerted on internal margin. Median space entirely greyish cream-color, with sparsely scattered brown scales. Reniform spot moderate, obliterate, concolorous with the pale median space, surrounded with a faint brown annulus. Transverse posterior line black, distinct and neatly defined, slightly dilated before internal margin and very slightly so immediately on the costa; very irregular: two prominent teeth, the lower of which about a third shorter than the upper. Sub-reniform spot entirely enclosed and connected with the t. p. line, resembling *C. piatrix*, Grote, in this respect. Centrally the subreniform spot is concolorous with the pale median space. The terminal part of the wing, beyond the t. p. line, is brown, centrally shaded and sprinkled with pale scales. Subterminal line grey, dentate. Nervules clothed with black scales more or less sprinkled with grey. Along terminal margin the wing shows a purplish lustre. A terminal series of deep brown interspaceal dots; fringes olivaceous brown.

Posterior wings dark orange-yellow, much like those of *C. neogama*, Guenée, in the disposition of the black bands, but the median band is not so constricted and is slightly broader. Base of the wing and

internal margin, clothed with long dust-colored hair, much as in allied species.

Under surface resembling that of *C. neogama*, sufficiently as to obviate any but a comparative description. The median band on the secondaries is quite similar, slightly broader and less constricted. Head and thorax above, brown; tegulæ with narrow marginal black lines; prothoracic pieces with faint darker lines. Abdomen dust-colored, tufted on the basal segments.

Exp. ♀, 3.00 inches. Length of body, 1.30 inch.

*Habitat*.—Illinois, New York, Pennsylvania. Coll. Ent. Soc. Phila.

Several specimens examined. Resembles the description of *C. nebulosa* Edwds., but differs in several important particulars, the color of the ordinary spots, conformation of the median band on the under surface of the secondaries and the general aspect of these on the upper surface seem to be different, while some of the minor details, such as the color of the scales clothing the nervules, etc. will not apply properly to *C. ponderosa*, nobis.

*Catocala fratercula*, n. s. (Plate 4, fig. 3, ♂.)

Anterior wings rough, not silky, pale grey, shaded with greenish scales basally and with oblique blackish shades terminally. Basal half-line, black, narrow. Basal and sub-basal spaces covered with olivaceous green scales. Transverse anterior line irregular, black, distinct at costa, below which the line becomes faint and sub-obsolete. Median space pale grey anteriorly. A central costal black oblique shade connecting with the reniform spot. Posteriorly the median space is darker, shaded with greenish or yellowish scales. Reniform spot faint, large, with a brownish center, surrounded with a black annulus. Sub-reniform spot obsolete. Transverse posterior line black, distinct superiorly, inferiorly becoming pale and indistinct; without prominent teeth, where these are normally situate are two blunt, improminent nearly equal dentations, below them the t. p. line is slightly irregular undulate or sub-dentate without prominent inflections. Terminally, the wing is obscurely shaded with blackish and slightly greenish scales. An oblique sub-apical blackish shade. Sub-terminal line pale grey, sub-dentate. A terminal series of dark interspaceal linear spots.

Posterior wings dark yellow. A narrow median black band, the conformation of which is quite distinctive in the male. It is broadest superiorly, slightly dilated centrally, beyond which it becomes narrow and is acutely projected outwardly at a point above the dislocation of the terminal band. Beyond this projection it runs back to just be-

fore internal margin. The terminal black band is broad, attaining the marginal edge and leaving but a very narrow yellow scale patch, fringed with whitish hair, at apical angle. This band is entirely interrupted before anal angle, within which it forms a black spot; fringes dark grey.

Under surface dull yellow. On the anterior wings a broad sub-terminal black band, tapering to internal margin. A broad terminal black band, broadest at costa, leaving the apex paler.

On the secondaries the terminal black band is hardly interrupted, rather is it constricted, before anal angle. The median band does not correspond with its analogue on the upper surface, being somewhat abbreviated and rounded. In the female the angulation of the median band on the upper surface of the secondaries is not so apparent, so that this character is probably sexual.

Head, thorax and appendages, of a mixed greyish hue resembling the primaries in coloration, slightly shaded with olivaceous scales on the prothoracic pieces and tegulæ; abdomen dull testaceous.

Exp. ♂ and ♀ 1.80 to 2.00 inch. Length of body, 0.85 inch.

*Habitat*.—New York State. Rhode Island.

Several (♂ and ♀) specimens examined.

Larger than *C. polygama*, Guenée; the primaries resembling in general coloration those of *C. minuta*, Edwds., than which it is larger and has darker yellow secondaries. It appears to be of infrequent occurrence. No species of *Catocala* known to us varies so much as *C. minuta*, Edwds. All its varieties can be readily traced, however, after a proper study of its specific characters.

*Catocala præslara*, n. s. (Plate 4, fig. 4, ♂.)

Anterior wings lustrous, evenly and nearly entirely covered with pale cinereous and greenish scales which have a bright reflection. Basal half-line narrow, joining inferiorly a longitudinal dark brown streak somewhat as in *Catocala Clintonii*, Grote. Transverse anterior line dark brown, preceded by a faint, pale brownish, approximate, coincident line, which is obsoletely continued to a large dark brown patch resting on internal margin in the sub-basal space. The t. a. line is narrow, outwardly oblique, improminently angulated and slightly dilated on costa. Median space concolorous with the rest of the wing, but with a deeper green tinge. Reniform spot narrow, whitish, with a faint brown annulus. Obliquely placed with regard to this, is a brown costal shade. Sub-reniform, unconnected with the t. p. line, spherical, concolorous with the rest of the wing. Transverse posterior line narrow, dark brown, broadly marked immediately on costa, dilated along the last inflection

above internal margin. Two prominent teeth, elsewhere the line is but very slightly irregular if we except the usual prominent inflection above internal margin. A brown shade band follows the t. p. line, largely interrupted centrally. Sub-terminal line, pale greyish, sub-dentate. Terminal space concolorous with the rest of the wing, clouded with brown sub-apically and slightly above internal angle; a series of connected, terminal interspaceal brown dots. Fringes dark, interrupted slightly with grey.

Posterior wing bright yellow. The median black band is irregular, —closely preceded superiorly by a luniform streak which shows more plainly on the under surface and is usually, especially in the female, more or less absorbed by the band,—greatly constricted at within its middle and joining within internal margin a parallel basal black shade band. Terminal black band interrupted inferiorly, forming an isolated black spot before anal angle. Fringes whitish, interrupted broadly five times with black below the yellow apical patch.

Under surface very pale yellow. A very irregular sub-terminal black band on the primaries, tapering to either margin and closely preceded by a luniform discal spot which is more or less merged with the band and gives this a furcate appearance. In the female this band is broader, entirely absorbing the discal spot. Terminally the wing is shaded with blackish, leaving the edges paler. Fringes more interrupted with greyish than on the upper surface. On the posterior wings the middle band is similarly associated with that on the anterior wings, but does not attain the costa. Head, thorax and appendages similar to anterior wings in coloration, with dark lines on the prothorax and tegulæ; centrally the discal scales show a brown tinge. Abdomen above, dusky testaceous; beneath, with under surface of thoracic parts, and inner surface of legs, white; outer surface of legs pale brownish; tarsi sub-annulate.

Exp. ♂ and ♀ 1.50 to 1.70 inch. Length of body, 0.80 inch.

*Habitat*.—New York.

Our Collection and that of Ent. Soc. Phil., numerous (♂ and ♀) coincident specimens examined.

Resembles *C. nuptula* Walker, from which it differs by its uniformly smaller size, the paler yellow of the posterior wings and the almost metallic lustre of the upper surface of the primaries.

Taken, associated with *C. minuta*, Edwds., *C. gracilis*, Edwds., *C. polygama*, Guenée and *C. nuptula*, Walk., on fences in and around the Central Park, New York city. No species of *Catocala*, known to us

possesses the peculiarly even brilliancy of the scales on the upper surface of anterior wings, which characterizes this pretty little species.

*Catocala formula*, n. s. (Plate 4, fig. 5, ♂).

Anterior wings dark cinereous. Basal half-line black, distinct, angulated. Beyond, and obliquely placed with regard to this line, is a small black spot in the sub-basal space, surrounded by paler, slightly greenish scales. Transverse anterior line black, oblique, even, with one prominent inward reflection at internal nervure, preceded by brown scales. Median space dark cinereous; an angulated median shade line extends from costa to reniform spot, above. Reniform spot large, ill defined superiorly where it is projected, with a black encircling line, filled in with pale greenish or bluish scales, with an internal brown annulus. Sub-reniform spot, complete, rounded, somewhat parallel, ovate, unconnected with t. p. line, very contiguous to the reniform, the annuli touching between the spots, centrally concolorous with the rest of the median space. Transverse posterior line black, even, with out prominent teeth, its total shape resembling a bracket ([), angulated below costa, whence it runs outwards in a parallel direction then excavate in a transverse direction to above first m. nervule, where a slight projection shows a rudimentary "tooth," thence straightly, somewhat undulated, to above internal nervure where it makes an inward reflection corresponding to that below the costa, joining internal margin with a slighter outward excavate reflection. The t. p. line is followed by a prominent brown band. Sub-terminal line serrate, whitish, followed by a dark cinereous coincident shade. A terminal series of black interspaceal dots; fringes concolorous with the wing.

Posterior wings bright yellow. The median black band much as in *C. fratercula*, nobis, being angularly projected above the interruption of the terminal black band in the male and roundedly, in the female. The isolated portion of the terminal black band is rather elongated. A blackish longitudinal shade streak, indicated by longer, hair-like scales. Under surface bright yellow, marked as usual, with a sub-terminal and terminal black band on either wing.

Head and thorax cinereous; prothoracic pieces with a prominent superior black line. Abdomen dull testaceous, anal segment darker. Beneath whitish; legs clothed with grey scales; tarsi sub-annulate.

Exp. ♂ and ♀, 1.60 to 1.80, inch. Length of body, 0.80.

A number of specimens of both sexes examined.

*Habitat*.—New York State, Rhode Island. Coll. Ent. Soc. Phila.; our own Collection and that of Mrs. S. W. Bridgham, N. Y.



Resembles Abbot's figure of ♀ *Catocala amasia* Smith sp. in the conformation of the t. p. line, but differs in detail. The sexes are similar in *C. formula* nobis. We have difficulty in believing that the very different male *C. amasia*, is properly associated with the female figured by Abbot. In this case the male would retain the specific name proposed by Sir. J. E. Smith.

*Catocala scintillans*, n. s. (Plate 3, fig. 6, ♂.)

Anterior wings of an even dark brown color, which extends from their base to the subterminal line, obscuring the ordinary lines which are obsolete and faintly indicated by darker costal marks. This dark portion of the wing is overlaid with greenish bronzed metallic scales arranged into transverse narrow striæ, which give the wing, in certain lights, a brilliant reflection. At base, below the internal nervure, the squamation is paler. From the s. t. line to external margin the squamation is grey shaded with pale brown scales following the course of the s. t. line which is regularly dentate, sloping inwardly before costa; the pallor of this portion of the wing contrasts forcibly with the dark hue of the rest. The nervules, terminally, are covered with mixed pale and dark scales. A continued series of dark brown interspaceal dots; a narrow dark terminal line, than which the fringes are a little paler.

Secondaries, orange yellow; internal margin clothed with long, very pale brown hairs. Median and terminal bands, brownish-black; the former, slightly irregular and becoming very narrow just before internal margin, the latter, even, with but a single slight distention at a little within its middle. Terminally there are a few narrowly arranged orange yellow scales which, however, do not distend into the usual apical mark; fringes pale.

Under surface much as in *C. innubens* Guenée; the secondaries are largely covered with orange colored scales; median band distinct and tapering to internal margin.

Head and thoracic region above, covered with mixed pale and dark brown scales. Abdomen pale testaceous brown, nearly concolorous with the long hairs which clothe the internal margin of the secondaries. Under surface of body very pale; anterior tarsi brown on their upper surface, sub-annulate.

Exp. ♂ 2.60 inches. Length of body 1.25 inch.

*Habitat*.—Pennsylvania. Coll. Ent. Sec. Phil.

The peculiar ornamentation of the upper surface of the primaries is very distinctive and curiously reminds us of certain species belonging to the Sphingid genus *Erinnyis*.

**LABENTIA**, Treitschke.**Larentia geminata**, n. s. (Plate 3, fig. 6, ♀.)

White. Anterior wings white or whitish, crossed by five broken black bands followed or preceded by continued yellowish testaceous or olivaceous shades. Extreme base, white, with a testaceous shade. First band (basal) entire, continued, irregularly and angulatedly sinuate, followed by a nearly coincident testaceous shade. Second black band usually more distinct and furcate before costa, below which it forms a series of black dots to internal margin. The third is also usually furcate at costa, thence maculate to internal margin, composed of a double series of black spots, more or less connected with the fourth band by black scales clothing the nervures below the disc, and preceded by a testaceous shade band. The fourth band is more continuous than the third, similar in appearance, being likewise furcate on costa, below which it is chiefly composed of black scale patches on the nervures of which there is a double series. Here, the wing is traversed by one or two testaceous shade bands, more or less coalesced and undefined. Fifth band more continuous than the rest, usually broken on the interspaces between the second and fourth median nervures, angulated on the interspaces, followed by a sub-obsolete series of interspaceal dots and by a testaceous shade on the terminal space. A terminal, black, macular line, interrupted at the middle of the interspaces. Fringes whitish.

Posterior wings whitish; a faint geminate subterminal band composed principally of dark scales on the nervures. Fringes whitish.

Under surface pale, reflecting the ornamentation of the upper surface on both pair.

Head, white; palpi black beneath; a frontal black line between the antennæ; prothorax with a testaceous tinge. Thorax and tegulæ whitish, spotted with black. Abdomen whitish, with scattered black scales; terminal segment prominently marked with black above; anal hairs whitish. Legs whitish, with black streaks on the outer surfaces. Antennæ simple.

Exp. ♂ and ♀, 1.10 inch. Length of body 0.50 inch.

*Habitat*.—New York State.

This species will be readily distinguished by its pale coloration, its conspicuous irregular black bands associated with faint yellowish coincident shades.

**HELIOMATA**, n. gen.

A genus allied to *Baptria* and *Erateina*. It differs from the former in the larger secondaries and slightly stouter and longer antennæ which,

in the male, are slightly ciliate beneath. The caputal parts are much reduced and proportionally even smaller than in *Baptria*. From *Erateina* it differs by the absence of the abdominal marginal fold of the secondaries. The wings are large; primaries slightly excavated or sinuous on external margin before the angle.

The species are blackish, powdered with yellowish atoms beneath and provided with metallic bands on the upper and lower surface of the wings, which acquire a bluish lustre in *H. infulata*. *H. crota* from Surinam belongs to this genus and probably other species hitherto referred to *Erateina*, the types of which latter genus are quite distinct from the present. Our species are from Virginia and New York. Their flight is apparently diurnal.

**Heliomata infulata.**

*Baptria infulata*, Grote, Proc. E. S. Phil. Vol. 2, p. 67, Pl 3, fig. 4. (1863.)

*Erateina infulata*, Grote, Proc. E. S. Phil. Vol. 3, p. 542. (1864.)

*Habitat*.—Virginia. Coll. Ent. Soc. Phil.

**Heliomata cycladata**, n. s. (Plate 4, fig. 9, ♀.)

Allied to *H. infulata*. Anterior wings blackish, largely covered with deep yellowish scales, especially margining the pale oblique bands which are placed as in *H. infulata*, but broader and greatly paler. Two exterior tremulous lines of metallic scales as in *H. infulata*, but more approximate and less bluish. Secondaries with a very broad pale median band, much wider and paler than that on the secondaries of *H. infulata*; two exterior metallic lines as in the primaries but wider apart.

Under surface resembling upper in ornamentation, but the bands are paler and the deep yellow central scales on the primaries are wanting. Some pale yellow costal marks at base. Head, with powdery yellowish atoms on the clypeus, behind, with a narrow ring of yellowish scales. Prothorax and tegulæ dark, mixed with glistening scales. Abdomen dark; the segments above narrowly ringed with yellow scales. Beneath, the legs and thoracic parts yellowish, the former with scattered black atoms. Abdomen pale yellowish; anal segment brownish.

The male of this beautiful species resembles the female, but the bands on the wings are wider.

Exp. ♂ and ♀ 1.00 inch. Length of body 0.30 inch.

*Habitat*.—New York State. Coll. Ent. Soc. Phil. Also Coll. Mr. James Angus, West Farms, N. Y., and of Messrs. F. & J. Tepper and E. L. Graef, Brooklyn, N. Y.

**Heliomata elaborata.**

*Baptria elaborata*, Grote, Proc. E. S. Phil. Vol. 2, p. 67, Pl. 3, fig. 5. (1863.)

*Erateina elaborata*, Grote, Proc. E. S. Phil. Vol. 3, p. 542. (1864.)

*Habitat*.—Virginia. Coll. Ent. Soc. Phil.

**Synopsis of the genera and species of the Family PSELAPHIDÆ.**

BY EMIL BRENDEL, M. D.

[Read Jan. 15th, 1866.]

In order to induce Entomologists and Collectors to take more interest in the study of this highly interesting family, I shall draw the outlines of the characters proper to every species in the shortest manner, without further description, with the view to enter into correspondence with many on that particular subject. I shall adopt the fundamental classification of Dr. John L. LeConte, as it is not yet disturbed by any new form discovered since.

Any member belonging to this family is easily recognized by the stiff, immovable abdomen, with but five or six segments, which excludes the Staphylinidæ, and by the abbreviated elytra and the form of the tarsi and coxæ, which exclude the Scydmanidæ. The whole family is divided into two sub-families: the Pselaphidæ proper and the Clavigeridæ, which are distinguished by having only 1—6 antennal joints, while the Pselaphidæ have 10—11 in number. The Pselaphidæ are divided thus:—

A.—Posterior coxæ transverse, not contiguous. Abdomen five-jointed.

PSELAPHINI.

B.—Posterior coxæ conical, contiguous. Abdomen six-jointed. EUPLECTINI.

The first section is divided by the form of the head and the insertion of the antennæ, thus:—

I.—Front produced into two approximate tubercles for the insertion of the antennæ. Abdomen marginate. *Pselaphi.*

II.—Front not produced, flat or excavated, and the antennæ inserted on the side and below the frontal margin. *Bryares.*

The *Pselaphi* are again divided into those with two equal claws, including the genera *Ceophillus*, *Cedius*, *Tmesiphorus*, *Ctenistes*, *Tyrus*, and *Cercocerus*; with two unequal claws, which are till now not represented in the United States; with one claw, represented by the genera *Pselaphus* and *Tychus*.

The above mentioned genera, with their species, differ as follows:—

a. *Tarsi with two claws.*

*Antennæ moniliform.*

**CEOPHILLUS, Lec.**

Antennæ with equal joints in ♀, unequal in ♂; the maxillary palpi with the last two joints lamelliform.

**C. monilis**, 3.3 m. m. long.—*Hab.* Northern States.

*Antennæ clavate.***CEDIUS**, Lec.

Maxillary palpi with the third joint transverse, the fourth lunate, convex.

**C. Ziegleri**, Lec., 2.7 m. m. long, with three grooves near the base of the thorax, and two small impressions near the middle. *Hab.*—Mountains, Southern States. Iowa.

**C. spinosus**, Lec., 1.9 m. m. long, with a single transverse sulcus near the base of the thorax. *Hab.*—Mountains, Southern States.

The sexual differences in both species are: ♂, the eighth joint of the antennæ with a tooth-shaped prolongation, and the trispinous anterior thigh.

**TMESIPHORUS**, Lec.

Maxillary palpi, second and third joints with setiform appendages, the fourth joint triangular, emarginate, appendiculate.

**T. costalis**, Lec., 3.3 m. m. long, has the first and second abdominal dorsal segments laterally carinate. *Hab.*—Atlantic States.

**T. carinatus**, Lec., 2.4 m. m. long, has the abdomen in the middle carinate throughout, and the first and second segment an abbreviated lateral carina. *Hab.*—Atlantic States.

Sexual differences: ♂, an emargination on the base of the last antennal joint, which is wanting in ♀.

**CTENISTES**, Reichenback.

The joints of the maxillary palpi with long appendages, the two last joints transverse, ovate.

Three species much alike in form, differing chiefly in size.

**C. pulverens**, Lec., 2.3 m. m. long. The two last joints of the palpi ovate. *Hab.*—California.

**C. piceus**, Lec., 1.9 m. m. long. The two last joints of the palpi oblong. *Hab.*—Northern States.

**C. Zimmermanni**, Lec., 1.6 m. m. long. The two last joints of the palpi globular. *Hab.*—Gulf States.

The sexual differences consist in the more convex form of the thorax in the ♀ and the very long ultimate antennal joint in the ♂.

**TYRUS**, Aubé.

Maxillary palpi with the last joint ending in a seta.

**T. humeralis**, Aubé, is the only species found in the United States, and has a form resembling a *Bryaxis*. 1.75 m. m. long. *Hab.*—Northern States.

**CERCOCERUS**, Lec.

Maxillary palpi with the third joint very small, the fourth very long.

**C. batriscioides**, Lec. The only species; the antennal joints are moniliform except the last, which is very large, oval, inflated. Long 1.9 m. m. *Hab.*—Mississippi Valley.

b. *Tarsi with one claw.*

**PSELAPHUS**, Herbst.

Maxillary palpi with the last joint club-shaped, very long.

- P. Erichsonii**, Lec., differs from the southern form *P. longiclavus* by the last joint of the maxillary palpi, which is pedunculate from the middle of its length. Long 1.75 m. m. *Hab.*—Northern States.
- P. longiclavus**, Lec. Long 1.8 m. m. Last joint of the palpi a long club. *Hab.*—Southern States.

**TYCHUS**, Leach.

Maxillary palpi with the third joint triangular and the last joint hatchet-shaped.

- T. longipalpus**, Lec. The third joint of the palpi is as long as the last and nearly cylindrical, the anterior coxæ are armed with a spine in ♂. Long 1.7 m. m. *Hab.*—Northern States.
- T. minor**, Lec. The thorax is shorter and rounded than in *T. longipalpus*, two punctures before the eyes, the third joint of the maxillary palpi is triangular. Long 1.4 m. m. *Hab.*—Northern States.
- T. puberulus**, Lec. Third joint of the palpi long, cylindrical; anterior and posterior coxæ of the ♂ armed with curved spines. Long 1.6 m. m. *Hab.*—California.
- T. tenellus**, Lec. Third joint of the palpi small, triangular. Stature slender, shining. Long 1.3 m. m. *Hab.*—California.
- T. bythinoides**, Brendel. Third joint of the palpi globular, small; first joint of the antennæ very long, cylindrical; the second large, globular; the following small, transverse; the last large, hatchet-shaped. Long 1.4 m. m. *Hab.*—Eastern States.

The *Bryaxes* are divided in those with the abdomen strongly margined, which have all only a single claw on the tarsi, and those with the abdomen not margined, which are represented by the genus *Batrius* and the sub-genus *Arthmius*, and have two unequal tarsal claws.

I.—*Abdomen margined, tarsi with one claw.*

**BYTHINUS**, Aubé.

Maxillary palpi with the last joint securiform. Antennæ 11-jointed.

- B. carinatus**, Brendel. The maxillary palpi, second joint long, clavate; third small, globular; fourth large, hatchet-shaped. The antennæ, first joint long, cylindrical; second large, globular; the head carinate above, each side before the eyes a small groove. Long 1.66 m. m. *Hab.*—Pennsylvania.
- B. zonatus**, Brendel. The head is plane with two small grooves, the last antennal joint very large, the other joints, except the two first, small, transverse; the thorax has one groove and a punctured zona at the base. Long 1.2 m. m. *Hab.*—Atlantic Seacoast.

**BRYAXIS**, Leach.

Last joint of the palpi fusiform. Antennæ 11-jointed.

† *Thorax with a basal transverse sulcus and three equal grooves.*

a. The thoracical sulcus connecting the three basal grooves.

**B. conjuncta**, Lec. ♂, anterior tibiae in the middle armed with a spine, and the three last antennal joints much enlarged. Long 1.8—2.0 m. m. *Hab.*—Northern States.

b. The thoracical sulcus connecting the two lateral grooves faintly.

**B. foveata**, Lec. The three equal thoracical grooves are very ample and punctured, the thorax impunctate; first abdominal dorsal segment faintly bistriate, striae distant. Long 1.4 m. m. *Hab.*—Cal'a.

**B. dentata**, Say. ♂, first abdominal dorsal segment lobed, the lobe overhanging the third segment. Long 1.9 m. m. *Hab.*—North'n States.

**B. illinoensis**, Brendel. ♂. First abdominal dorsal segment two-lobed, the acute lobes overhanging the first segment, the intermediate trochanters armed with a spine. Long 1.5 m. m. *Hab.*—Illinois.

**B. floridana**, Brendel. ♂. The two first segments two-lobed. Long 1.7 m. m. *Hab.*—Southern States.

**B. abdominalis**, Aubé. ♂. The three first segments two-lobed. Long 1.9 m. m. *Hab.*—Eastern States.

†† *The median thoracical groove smaller. Sulcus wanting.*

a. Lateral grooves on the lateral surface.

**B. luniger**, Lec. First abdominal segment bistriate near the middle. ♂, with the three penultimate antennal joints transverse, lunate; the last ovate. Long 2.0 m. m. *Hab.*—Eastern States.

**B. cavicornis**, Brendel. Differing from *B. luniger* only by the three last joints of the antennae in the ♂, of which the ninth is triangular, the tenth transverse, oblongate, the last triangular, emarginate. Long 2.0 m. m. *Hab.*—Pennsylvania.

b. First abdominal segment without impressed lines. ♂, the fifth antennal joint larger.

**B. puncticollis**, Lec. The three grooves on the head large, the thorax punctulate, the abdominal striae faintly indicated. Long 1.3 m. m. *Hab.*—Eastern States.

**B. compar**, Lec. The frontal groove faint, the thorax stronger, punctate. Long 1.2 m. m. *Hab.*—California.

**B. subtilis**, Lec. The three grooves on the head small, the thorax not punctured. Long 1.3 m. m. *Hab.*—California.

c. First abdominal dorsal segment with two approximate, faintly impressed, diverging striae.

**B. congener**, Brendel. Testaceous, punctate. Long 1.0 m. m.

**B. rubicunda**, Aubé. Piceous-black, elytra red, thorax impunctate. Long 1.5—1.9 m. m.

**B. scabra**, Brendel. Thorax strong, confluent punctured, black. Long 1.33 m. m. *Hab.*—Eastern States.

d. First abdominal segment with two distant striae.

**B. propinqua**, Lec. Long 1.4 m. m.

†††† *The thoracical grooves very small or obsolete.*

**B. tomentosa**, Lec. Lateral thoracical grooves very small on the lateral surface.

**B. inornata**, Brendel. The thoracical foveae wanting; head plain, with two faint punctures before the eyes; elytra plain, polished; striae wanting. First abdominal segment at base with a broad bar. Long 1.4 m. m. *Hab.*—South Carolina.

**DECARTHEON**, Brendel.

Maxillary palpi, last joint fusiform. Antennæ 10-jointed.

a. Thorax with one basal groove and nearly entire dorsal striæ on the first abdominal segment.

**D. abnorme**, Brendel. (*Bryaxis abnorme*, Lec.) Head with two discal grooves and a broad excavation in front. ♂, intermediate thighs very little emarginate above. A dark long pubescence. Long 1.65 m. m. *Hab.*—Northern States.

**D. exsectum**, Brendel. Head with very small discal grooves and a small excavation in front. ♂, intermediate thighs with a strong acute spine above. A long pubescence. Long 1.7 m. m. *Hab.*—Eastern States.

**D. stigmatosum**, Brendel. Head flat, with four small punctures. ♂, intermediate thighs narrow and deeply emarginate above near the knee-joint. Pubescence short. Long 1.72 m. m. *Hab.*—Penn.

**D. longulum**, Brendel. (*Bryaxis longula*, Lec.) Head with two ample, variolate, distinct grooves, an excavation in the front. ♂, intermediate thigh narrowly and acutely emarginate. Thorax not punctured. Long 1.5 m. m. *Hab.*—Pennsylvania.

**D. formiceti**, Brendel. (*Bryaxis formiceti*, Lec.) Head with two distinct grooves and an excavation on the front. Thorax punctulate. ♂, intermediate thighs with a strong spine above near the middle. Long 1.2 m. m. *Hab.*—Southern States.

**D. strenuum**, Brendel. Head plain, punctured. Thorax punctured. Pubescence very dense and long. ♂ unknown. Long 2.0 m. m. *Hab.*—Penn.

b. Thorax with a basal transverse sulcus, groove wanting.

**D. cornutum**, Brendel. Head nearly plain in ♀ (?), uneven and horned in ♂. Thighs plain. Long 2.0 m. m. *Hab.*—Mississippi Valley.

**EUPSENIUS**, LeConte.

Maxillary palpi, last joint acute-ovate. Antennæ short, joint transverse, the last very large. Pubescence wanting.

**E. glaber**, Lec. Thorax three-grooved, with a basal sulcus. Long 1.1 m. m. *Hab.*—Southern States.

**E. rufus**, Lec. Thorax three-grooved, sulcus wanting. Long 1.4 m. m. *Hab.*—Southern States.

**II.—Abdomen not margined, tarsi with two unequal claws.**

**ARTHEMIUS**, LeConte.

Thorax not sculptured. Body convex.

**A. globicollis**, Lec. Head with two grooves, thorax globular smooth, elytra without dorsal striæ. ♂, fifth antennal joint large, globose; the anterior tibiæ armed with a spine near the middle. Long 1.6 m. m.

**BATRISUS**, Aubé.

Thorax sculptured. Body elongate.

**I.—Posterior tibiæ unarmed.**

a. Front concave. Vertex rounded, not carinate.

**B. ionæ**, Lec. Head behind produced in a very high rounded tumor. ♂, intermediate trochanters armed with an acute spine. Long 2.66.



**B. juvenis**, Brendel. Head behind very little convex and very obsoletely carinate. Elytra punctured. ♂ unknown. Long 1.4 m. m.

b. Front concave. Occiput one-carinate.

**B. confinis**, Lec. Head behind carinate in the middle. Thorax obsoletely three-lineate, two-carinate, at the base each side of the basal groove are two acute tubercles. ♂ unknown. Long 2.2 m. m.

c. Front concave. Occiput three-carinate.

**B. armiger**, Lec. Head behind with a high carinate tumor. Thorax three-lineate, with three discal recurved spines. ♂, anterior tibiae and intermediate thighs armed near the middle with very strong prominent thorns. Long 2.4 m. m.

**B. monstrosus**, Lec. Head behind not much tumorous, three-carinate. Thorax convex, sculpture of the lines and carinae obsolete. ♂, anterior tibiae and intermediate thighs strongly emarginate near the knee joints. Long 2.4 m. m.

**B. ferox**, Lec. (?) Head as in *monstrosus*. Thorax more definitely sculptured. ♂ as in *monstrosus*. The last joint of the antennae shorter than in *monstrosus*. Long 2.4 m. m.

## II.—*Posterior tibiae armed on the end with a long, slender spine.*

a. Front retuse. Vertex convex, surrounded by a sulcus.

**B. frontalis**, Lec. Head smooth behind, not carinate. Thorax tri-lineate. Elytra impunctate. Stature resembling *ferox*. Long 2.4 m. m.

\* *Elytra punctured.*

**B. scabriceps**, Lec. Head scabrous, not carinate. Thorax three-lineate. Elytra sparsely punctulate. Last antennal joint armed with a tooth at the base. Long 2.0 m. m.

**B. punctatus**, Lec. Head smooth, not carinate; thorax three-lineate; elytra very strongly punctured. ♂, last antennal joint armed with a tooth at the base. Long 2.1 m. m.

**B. riparius**, Say. Head slightly carinate on the vertex. Elytra very perceptibly punctured. Thorax laterally emarginate behind the middle. Last antennal joint very long. ♂, last antennal joint at the base with a rather prominent long tooth. Stature slender. Long 1.5 m. m.

**B. globosus**, Lec. Head strongly carinate on the vertex. Elytra slightly punctulate. Thorax laterally entire. Last antennal joint short. ♂, penultimate antennal joint globose, larger than the last, which has no tooth. Long 1.7 m. m.

\*\* *Elytra decidedly impunctured.*

**B. nigricans**, Lec. Head tuberculate, not carinate on the vertex. Thorax three-lineate. ♂, penultimate antennal joint as large as the last. Long 1.9 m. m. *Hab.*—Northwestern States.

**B. albionicus**, Aubé. Head not carinate on the vertex. Thorax two-lineate. ♂, ultimate antennal joint armed with a tooth. ♀, last abdominal segment conical, acute. Long 2.2 m. m. *Hab.*—California.

**B. spretus**, Lec. Vertex not carinate. Thorax bilineate. ♂, last antennal joint not dentate; the penultimate as large as the last. ♂, last abdominal segment not acute. Long 1.6 m. m. *Hab.*—Penn.

b. Front, the elevated margin wanting, not sulcate, plain and punctured.

**B. bistriatus**, Lec. Head plain, densely punctured, bifoveate behind. Thorax bilineate. Elytra punctate. Long 2.1 m. m. *Hab.*—Penn.

**B. lineaticollis**, Aubé. Head plain, densely punctured, bifoveate. Thorax tri-lineate. Elytra not punctured. Long 2.5 m. m. *Hab.*—Eastern States.

#### REMARKS ON SEXUAL CHARACTERS.

The sexual characters of the species *Batriscus* under I, are expressed by the armature of the legs, and the tooth at the base of the last antennal joint, which joint is longer than in ♀. For those species under II, there is one character truly sexual, and that is the frontal margin, produced and overhanging the face in the ♂, while the ♀ has a single straight bar between the insertion of the antennæ. The last abdominal segment in most of them is more or less pointed in the ♀. The tooth on the last antennal joint is masculine in those species that are provided with it. But the penultimate large joint in *B. globosus*, *nigricans* and *spretus* may be considered masculine, though the want of it is not always feminine.

#### EUPLECTINI.

This section is divided as follows:—

A.—Tarsi with but one claw.

\* Antennæ straight.....**Trimium, Euplectus.**

\*\* Antennæ geniculate.....**Rhexius.**

B.—Tarsi with two equal claws.....**Faronus.**

#### A.—Tarsi with one claw.

##### **TRIMIUM**, Aubé.

The second ventral segment longest.

**T. globifer**, Lec. Lateral thoracical grooves connected by an arcuate sulcus. Occiput not impressed. Long 1.5 m. m. *Hab.*—Southern States.

**T. dubium**, Lec. Thoracical sulcus nearly straight. Occiput entire. Head with a semi-circular sulcus connecting four small foveolæ and a small groove in the middle of the vertex. Long 0.8 m. m. *Hab.*—Southern States.

**T. parvulum**, Lec. Thoracical sulcus nearly straight. Head without a central impression. *Hab.*—Southern States.

**T. impunctatum**, Brendel. Thoracical sulcus angulate. Occiput entire. Head with two oblong longitudinal grooves, connected by an angulated sulcus. Long 1.3 m. m. *Hab.*—Northern States.

##### **EUPLECTUS.**

The ventral segments equal.

\* *Body convex.*

**E. canaliculatus**, Lec. Thorax, two lateral grooves connected by a semi-circular sulcus, and an entire longitudinal sulcus. Long 1.0 m. m. *Hab.*—Northern States.

**E. cavifrons**, Lec. Thorax with three basal grooves connected by an angulated sulcus and a small discal groove. Front concave. Long 1.0 m. m. *Hab.*—Southern States.

**E. arcuatus**, Lec. Thorax with three grooves connected by an angulated sulcus, the disk concave. Long 1.0 m. m. *Hab.*—Northern States.

**\*\* Body depressed.**

**E. linearis**, Lec. Thorax with two grooves connected by a transverse sulcus and a longitudinal discal sulcus. Occiput impressed. Long 1.7 m. m. *Hab.*—Southern States.

**E. interruptus**, Lec. Thorax with three grooves connected by an angulated sulcus, from the lateral grooves running out forwards in the margin, and an oblong discal groove. Occiput entire. Long 1.6 m. m. *Hab.*—Southern States.

**E. confusus**, Lec. Thorax punctulate, with three grooves connected by an angulated sulcus and an anteriorly abbreviated longitudinal sulcus on the disk. Occiput impressed. Long 1.6 m. m. *Hab.*—Eastern States.

**E. difficilis**, Lec. Thorax with two lateral grooves connected by an arcuate sulcus and a central discal groove. Occiput impressed. Long 1.3 m. m. *Hab.*—Atlantic States.

**E. pumilus**, Lec. Thorax with two lateral grooves by a nearly straight sulcus and an oblong discal groove. Elytra, each with a round groove behind the middle. Occiput entire. Long 0.5 m. m. *Hab.*—Southern States.

**E. crinitus**, Brendel. Thorax with three grooves connected by an arcuate sulcus, disk smooth convex. Occiput entire. Long 1.4 m. m. *Hab.*—Illinois.

**E. ruficeps**, Lec. Thorax with two lateral grooves connected by an arcuate sulcus, disk smooth convex. Occiput entire. Long 0.5 m. m. *Hab.*—Southern States.

#### **RHEXIUS**, Lec.

Head and thorax transverse. Antennæ geniculate.

**R. insculptus**, Lec. Thorax with two lateral, isolated grooves and a longitudinal sulcus. Long 1.6 m. m. *Hab.*—Atlantic States.

**B.—Tarsi with two equal claws.**

#### **FABONUS**, Aubé.

Abdomen flexible, six-jointed, last joint retractile. Antennæ moniliform.

**F. Tolulæ**, Lec. Thorax with three isolated grooves. Head with three grooves. Long 2.0 m. m. *Hab.*—Southern States.

**F. Isabellæ**, Lec. Thorax with two lateral grooves and a basal transverse impression in the middle. Head with three grooves. *Hab.*—Southern States.

**F. parviceps**, Lec. Thorax with two lateral grooves and a basal transverse impression in the middle. Head with two grooves near the frontal margin, and a triangular impression on the frontal margin. Long 2.0 m. m. *Hab.*—Russian America.

Revision of the FOSSORIAL HYMENOPTERA of North America.

I. CRABRONIDÆ AND NYSSONIDÆ.

BY A. S. PACKARD, JR., M. D.

[Read November 13th, 1865.]

When two years since, with scanty material consisting of the more common forms, we began to study this most interesting group of Hymenoptera, it seemed a comparatively easy matter to decide upon what seemed truly generic and specific forms. Characters which we must now consider of scarcely subgeneric value, were unhesitatingly pronounced to be of full generic importance, and in some cases simple varieties were thought to be good species. The large sub-divisions of *Crabro*, of which *C. singularis*, *C. arcuatus*, and *C. interruptus* are types, were considered of generic value, and some of St. Fargeau's genera, which we now reject, were adopted. But the great influx of species made known to us by the writings of Mr. Frederick Smith of the British Museum, published in the Catalogue of Hymenoptera, and the more recent articles of Mr. E. T. Cresson in the Proceedings of this Society on the hymenoptera of Colorado Territory, collected by Mr. Ridings, and of Cuba, which formed the collection of Prof. F. Poey, together with much new material most liberally loaned me by Mr. Edward Norton, E. T. Cresson and the Boston Society of Natural History, which last is especially valuable as giving us several of Say's and Dr. Harris' types;\* has materially changed our views on the classification of the group. Thus our notions as to the value of different natural groups daily fluctuate with each new influx of species, so that it seems as if the natural system which every student strives after, were at the mercy of the opinion of each inquirer, changing and differing from other systems according to the stand point from which he regards nature. Our own impression received from the study of so difficult a group as the one under present consideration, is that our arbitrary and stiff systems can never express in words or in diagrams the unceasing variation and change of characters, now constant, and now slight and shifting, which take place in natural groups. Our notions of genera and species are in a great measure ideal and typical rather than real and fixed. Our descriptions, when good and reliable, are not descriptions of a single

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\* More special acknowledgment of aid in preparing this paper, will be made in the descriptions below.

individual, but of a large mass, whose separate peculiarities agreeing in the main, are combined into a "composition" or diagnosis. Nature thus constantly eludes our grasp, and after all nothing but a picture of the fitting form remains impressed upon the mind which we embody in an idealized form in words.

Also, in being compelled, in print, to treat of genera as if they were arranged in a continuous line from the highest to the lowest, one fails in expressing clearly to others his views as to the true relations of the groups. Thus we have to stop in our ascending series to interpolate aberrant forms, which must be described at this point, if anywhere, as the systematist is constantly drawn aside to deal with groups which stand out of the apparently normal succession of organized beings, consisting of degradational forms, and connecting links between members of a somewhat linear series, and outstanding genera difficult to locate. The ascending series is at times disturbed by constellations of forms which are so complexly grouped as to so divert the attention that it is difficult to take up the thread conducting to the close of the series. To our mind there must be a compromise between those naturalists who believe that all groups are "artificial," or in a state of unstable equilibrium, thus constantly changing their value; and those naturalists, on the other hand, who believe genera, families, orders and classes to be very easily limited, defined, and thus always recognizable from such definitions. Where an order is defined as depending on "complication of structure,"\* and families on "form," genera on details of structure, and species as depending on proportion and ornamentation, we find that such definitions apply just as truly to one division as another. Species differ in size and coloration, *and also* in form, as well as in details of structure, as beautifully exemplified in the groups under consideration. In fact, the difference between species and genera, and genera and orders, are but *differences in degree*, and relative terms; there is nothing *absolute* in nature.

Thus the present tendency to sub-divide old genera and admit many new ones, the necessity of establishing new families and sub-families, new orders and sub-orders, must convince the thoughtful observer that the terms classes, orders, etc., now in use are far too few to indicate the manifold sub-divisions, and groups of varying rank and importance actually existing in nature. The attempt to define such unequal divisions seems useless, seeing how little equivalent among themselves are, for example, the genera of another. Indeed, the sub-divisions already

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\* Agassiz, *Essay on Classification, Contributions*, Vol. 1, p. 170.

admitted in the animal kingdom are far too numerous to admit of distinct names for them. The only practical method of avoiding the present practice of burdening science with multitudinous and often unmeaning and superfluous names for the numerous groups constantly revealing themselves to the naturalist, is to fix upon the better pronounced groups, in different orders or sub-orders, for example, and balance them among themselves, indicating equivalent divisions so far as possible. It is only in this way that naturalists can harmonize their views. Thus retaining Latreille's term "family" for the groups of hymenoptera to which he applied it, why not adhere to it as a standard, and indicate the sub-families by name, while the sections and sub-sections need not be indicated by names, thus burdening nomenclature, but simply by figures or letters, or other convenient symbols. In our view the Family Crabronidæ seems equivalent in value to the Bombycidæ among lepidoptera, and its sub-families Philanthinæ, Crabroninæ and Pemphredoninæ rank with either of the twelve sub-families Bombycinæ, Arctiadæ or Attaci, etc. Thus the genera *Crabro*, *Blepharipus* or *Thyreopus*, or *Stigmus*, will become equivalent to *Attacus*, *Samia*, *Callosamia*, or *Eucronia*, and the groups of species of *Crabro*, of which *C. singularis*, *C. arcuatus*, *C. stirpicola* are types, will be equivalent to the three sub-divisions of *Arctia*, represented by *A. virgo*, *A. Dione* and *A. Nais*. By comparisons of this sort our ideas concerning these natural groups become better grounded.

We have below indicated and described, without feeling the necessity of naming, groups, which with our present material for study, we consider as sub-genera. We would treat sub-species in the same way, as they are what are often called "geographical varieties" or representative species. If sub-genera are named, the nomenclature is immediately changed from a *binominal* to a *trinominal* one. If we name the sub-species also it becomes *quadrinominal*, and thus science is still further burdened with a long array of useless names. We must strongly protest against the present bad fashion of naming so called "families" or minor collections of genera, connected by characters of very slight importance. Admitting that these inconsiderable sub-divisions are natural and founded in nature, let us for convenience forbear cumbering science with names for them. Thus Guenée sub-divides the family *Noctuidæ*, already very well circumscribed by Latreille, into some twenty "families;" to such an extent have specialists in some departments carried the process of sub-division.

*Zoological Characters.*

The most useful characters for separating genera and species, are those drawn from the appendages of the body, and those parts to which they are inserted. In the hymenoptera as a general rule, the base or insertion of the abdomen, where there is the greatest movement of the parts on themselves, and the end, wherein is placed the ovipositor or sting, or male organs of reproduction, vary much more than the middle of that region; so in the thorax, the prothorax is more useful than the meso- and meta-thorax, in being more variable, though not always so. In the "propodeum" (Newman) of hymenoptera, we have greater changes wrought than in any other parts of the trunk, and to this part especially the observer must always recur. In the head, we find greater variability as we go forward from the base. The clypeal region is of constant use, while the epicranium, and occiput especially, afford slight characters. In the wings, always in requisition among the hymenoptera, lie characters of the first importance in genera and species, but not so useful in the larger groups. Of the appendages, those of the head and abdomen are often more useful as a general rule than the thoracic—though not so available from their inaccessibility. There is thus a greater tendency to variation as we proceed from the centre of the body, taken as a whole, outwards to the periphery; the appendages vary more than the trunk, and the terminal, most differentiated portions of the appendages, vary more than their bases; so in considering the head, thorax and abdomen separately, the variation proceeds from the middle of each region, anteriorly and posteriorly. It is those parts most differentiated and therefore put to the most constant use by the insect that vary most. The peculiar habits and wants of the insect predetermine, or we would prefer to say, are *correlated* with its peculiar structure. Thus in the social bees which have to accumulate stores of honey, the brushes of hair on the legs are greatly developed over those solitary species, such as *Halictus*, which lay up slight stores in their single isolated cells; while in *Nomada* which cuckoo-like, is parasitic on other genera such as *Andrena*, the legs are almost naked; and in many genera of fossorial hymenoptera which are carnivorous, the legs are slender and entirely naked.

The Crabronidæ afford, so far as we are acquainted with their habits, most interesting examples of the interdependence of structure on the habits of the insect. As a group, they are essentially wood-wasps, making their cells in cylindrical holes in rotten wood, or enlarging nail-

holes in posts, as *Crabro singularis* does, according to the observations of Mr. Shurtleff, and as I have seen done by *Philanthus*, thus adapting them to the requirements of their young; or like the *Rhopalum pedicellatum*, *Stigmus fraternus* and *Crabro stripicola*, avail themselves of those plants whose stem has a pith which they can readily excavate and refit for their habitations. Thus the great variability of the fore legs in fossorial hymenoptera is especially marked; in the digging and tunnelling *Thyreopus* with its broad dilations and abnormal enlargement of the fore legs we are reminded strikingly of the moles among vertebrata. In the Apidæ, the hind legs are especially used for gathering pollen, while the fore legs assist the mouth parts in building and elaborating the cells and nest. In this family is a greater differentiation in the structure of the legs, correlated with the more diverse uses of the limbs. As we descend in the hymenoptera we find a great equality in form in the legs of the Ichneumonidæ and Tenthredinidæ; in some Chalcids, however, which in most respects are higher than the Ichneumonidæ, the hind legs are greatly enlarged for leaping like the coleopterous Halticus. Other cases will readily suggest themselves to entomologists.

In classifying the genera, within a sub-family, as well as the larger groups, the principle of Cephalization as advanced by Prof. Dana\* has always been our chief guide in arranging the hymenoptera, and before meeting with the views advanced by that author who has thrown so much light on the study of the articulates, we were accustomed to place highest those members of a group whose bodies were most concentrated, and had the elements of organization thrown farthest towards the head. In illustration, we regard *Haliectus* as lower than *Andrena* or *Apis*; *Zethus* and *Eumenes* as holding a subordinate position to *Polistes* and *Vespa*; in the Crabronidæ, *Stigmus* as inferior to *Blepharipus*, *Psen* to *Cerceris*; in the Nyssonidæ, *Trypoxylon* as much lower than *Oxybelus*, and so down the scale. In all these lower forms, we see the body lengthened out, the rings of the body more equally developed, showing a decided tendency to "vegetative repetition" so marked in the worms,—the "weight of organization" is withheld from the thorax and head, and retained in the abdomen. In short, the insect is degraded, decephalized. On the contrary, in what we believe to be the highest hymenopterous insect, the Honey bee, the parts of the body are all more referred to the head, thrown forwards and subordinated to that portion of the nervous system residing in the head, which is more analogous to the brain of the

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\* See several articles in the Amer. Journ. Sc. and Arts, 1863—1866.



vertebrates than in any other articulates, for it is *brain force* which more immediately decides the rank of animals than any other single character. The most intelligent of all insects, with a greater differentiation of the individual into sexes, and dimorphic sexes, with the division of labor carried out more minutely than in any other articulates, and in their intimate relation to the wants of man, the hymenoptera, and especially the Hive bee, to our mind, are true synthetic beings, as that term was used by the Botanist Fries, standing in the same relation to all the articulate series below, as the apple tree to all other plants, and in a strictly zoological point of view, as man does to all other vertebrates. The bee concentrates in its form all the normal characters of insects, and lacks the degradational features showed in greater or less abundance by those standing below it.

Some of the most useful characters in the Crabronidæ exist in the form of the clypeus, the comparative breadth of the epicranium, or breadth of the front between the eyes; and its sculpturing and amount of pubescence or hirsuties; in the antennæ, the relative length and proportion of the joints composing the scape and flagellum; as well as the size and proportion of the entire head, and especially the degree of convergence of the sides behind the eyes. In separating perplexing species we always first look at the sculpturing of the *propodeum* of Newman,\* or "thoraco-abdominal ring" of Newport, which, though closely united with the thorax, is in reality the basal ring of the abdomen, which, during the semipupa state, is in the hymenoptera transferred to the thorax, the rings of which it so closely simulates in form, sculpturing and colors, as to have led some of our best observers to confound it with the meta-thorax. It is this single character which separates most trenchantly the hymenoptera, as a group, from all other insects. In the Tenthredinidæ the propodeum is much as it exists in the lepidoptera, where it forms a membranous ring, less hard in consistence than either the thoracic or abdominal rings lying next to it.

In the Crabronidæ the end of the abdomen presents excellent generic and also specific characters, depending on the grooved or flattened tips. This part varies less in the Philanthinæ, and is of slight use in most of the Nyssonidæ.

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\* The metascutum and metathorax of most authors—See our remarks, on this segment and its developmental history, in *Proceedings Bost. Soc. Nat. Hist.*, Feb. 7, 1866.

*Geographical Distribution.*

The Crabronidæ are very exclusively confined to the north temperate zone, and though more have been described from Europe thus far, it is probable that North America will ultimately furnish as large a number. No fossorial hymenoptera, with the exception of the Ants, have been found in the truly Arctic regions. Our collections made in Labrador do not afford a single species. The Canadian fauna, which in the interior of the continent, extends towards the mouth of the Coppermine and Mackenzie rivers, embraces a few species; and there are a few species, members of the same fauna, which are found at the base of the White Mountains. Southwards, the species have a wide range. The same species occur in New England and the Middle and Western states alike. Colorado Territory affords another assemblage of species, as do the Gulf states and Cuba, so far as explored.

*Cerceris* is a more tropical genus than *Crabro* or *Philanthus*. The Pemphredoninæ occur far north in abundance; while the Nyssonidæ are most largely developed in subtropical regions, though *Oxybelus* abounds in the Canadian fauna. In the Arctic and temperate zones where are fewer species than southwards, these isolated forms are among the most typical, and simple; all bizarre, unusual forms resulting from different modes of coloration and disproportion of parts, being excluded. This tends to make the genera of the Temperate zone more symmetrical and easily limited. As we go into the tropics, Nature becomes more lavish of high, intense colors, and introduces many new modifications of generic form in the different species, so that the tropical genera offer a more heterogeneous mass of species. In the tropics is a greater differentiation of all characters depending on form, size and coloration, as well as habits. *Formica* is more specialized in its sexual development in the tropics, than in the temperate zone, and the Papilionidæ, a truly tropical family, as Wallace\* has well shown, have a greater range of variation both in sexual and specific characters than any other family of Lepidoptera.

*Classification.*

In the Crabronites, Latreille † united both the present groups Crabronidæ and Nyssonidæ with the Larridæ of Leach. The arrangement is the reverse of modern authors. He places *Pemphredon* and allies be-

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\* Trans. Linnæan Society, Vol. xxv. Pt. 1. 1865.

† Genera Crust. et Insectorum, 1809.

tween *Crabro* and *Cerceris*. Afterwards in 1825\* he makes his *Nyssonii* equivalent to the *Crabronites*.

Shuckard in 1837, in his "Essay on Indigenous Fossorial Hymenoptera" has given us the best studied work on these groups. His arrangement is free from many of those defects that marked the less conservative views of St. Fargeau and Dahlbom. He presents us the *Crabronidæ* as a whole, not separating minor groups of genera under distinct names. *Philanthus* heads the family; next follows *Cerceris*, *Mimesa* and *Psen*, then *Arpactus*, *Gorytes*, *Alyson*, *Mellinus*, and then the genera composing Dahlbom's *Pemphredonidæ*, which are followed by *Crabro*, which is not subdivided, and *Trypoxylon* ends the family.

The *Nyssonidæ* begin with *Oxybelus*, followed by *Nysson*, and the third and last genus *Astata*. Thus long before the Family *Pemphredonidæ* was proposed by Dahlbom, the genera comprising it were placed together, though no separate divisions were made for them, and subordinated to the *Philanthidæ*.

St. Fargeau in the *Histoire Naturelle des Insects*, 1845, distributed the genera of his *Crabronides* into four tribes. The *Cercerites* heads the family, and besides the genera *Cerceris* and *Philanthus*, includes *Psen* and *Nysson*. The second tribe, *Gorytites*, includes *Gorytes* and *Harpactus*. Next, the *Mellinites* include *Alyson*, *Mellinus*, *Cemonus* and *Pemphredon*. The fourth tribe, *Crabronites*, includes *Stigmus*, *Crabro* and the numerous genera established by himself and Brullé, in 1834, in the *Annales de Soc. Ent. France*, iii, closing with *Nitela* and *Oxybelus*. His fifth tribe, *Trypoxylites*, is composed of *Trypoxylon* and *Psen*. His sixth tribe, *Astatites*, corresponds to the *Larridæ* of Leach; while the *Nyssonidæ* are not recognized at all, *Stizus* being assembled with *Bembex* and *Monedula* in his thirteenth family *Bembecides*.

Dahlbom's arrangement, published in the same year, is less clear and natural than that of St. Fargeau. He divides his family *Crabronidæ* into four groups, of which the *Crabronidæ propriæ* consist of *Crabro* as dismembered by St. Fargeau and Brullé, with the addition of *Ectemnius* Dahlb., which is not represented so far as we are aware in North America. Led by *Lindenius*, his second group *Nyssoniformes* by *Entomognathus*, equally unfortunate with *Ectemnius* in not being recognized, except in synonymical lists, by later observers, passes by *Notoglossa* to *Oxybelus*. For the reception of *Nitela*, strangely separated

\* Familles naturelles du Règne animal, 1825.

from *Oxybelus*, the sole representative of the third group, Pompiliformes, he passes to the *Crabronidæ Speciformes*, headed by *Dasyproctus*, passing by *Rhopalum* and terminating in *Trypoxylon*, which leads to the next Family *Pemphredonidæ*. This last group we accept as well circumscribed and natural. Next follows the *Mellinidæ* represented by *Mellinus* alone. Equivalent to this are the *Philanthidæ*, headed by *Diamma* Dahlb., and *Didesmus* Klug and Erich., which with *Anthophilus* Klug MSS., and *Simblephilus* Jurine, share the fate of St. Fargeau's genera and Dahlbom's *Ectemnius* and *Entomognathus*.

The Nyssonidæ are distributed in the *Larridæ*, where, in his arrangement, are to be found *Nysson* and *Gorytes* heading the group, but separated widely from the *Crabronidæ* (emend.) by the *Bembecidæ*.

Dahlbom's arrangements is interesting as exhibiting the analogous forms of these lower members of a group to other entire groups of a still more degraded position, such as the Spheciform *Crabronidæ* represented by *Trypoxylon* which correspond to the lower family Sphegidæ Dahlb. The Pompilidæ are represented by *Nitela*. He also considers as parallel groups *Pemphredon* and *Crossocerus*, *Blepharipus* and *Mellinus*, *Thyreopus* and *Bembex* while *Crabro* is offset by *Nysson* and *Cerceris*.

The best point in Dahlbom's classification is his admitting and limiting the *Pemphredonidæ*.

Mr. F. Smith's arrangement, published in 1856,\* seems to be based upon Shuckard's arrangement, with judicious modifications. His arrangement of the *Crabronidæ* is the same except in placing *Psen* next to *Cerceris*, and inserting *Cemonus*, *Ceratophorus* and *Diodontus*, in descending order, between *Psen* and *Mimesa*, which seems unwarrantable, as these two genera are most closely connected by some species described by us below. He closes the groups with *Oxybelus*, *Nitela* and *Trypoxylon*, which we have referred to the Nyssonidæ. The Nyssonidæ is a group quite different from Shuckard's limitation of it. It is composed of twelve instead of three genera—*Mellinus*, *Didineis*, *Alyson*, *Harpactus*, *Gorytes*, *Heliorcytes*, *Palarus*, *Sericophorus*, *Nysson*, *Eceirus*, *Larra* and *Stizus*, in descending order are its members. In this arrangement we have the Nyssonidæ more clearly circumscribed, and rendered a less chaotic group than by any previous author. The

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\* Catalogue of Hymenopterous Insects in the British Museum, Pt. iv, 1856.

unrivalled collections in the charge of this eminent hymenopterist, have been used with great skill and good judgment.

In agreeing with Dahlbom in separating the Crabronidæ into three sub-families, we do not agree with authors in placing the Pemphredoninæ between the Philanthinæ and Crabroninæ. We would rather consider them as nearly parallel groups, of which the Pemphredoninæ occupy the lowest position. *Psen*, a degraded *Cerceris*, is closely allied to *Cerceris*, but *Stigmus*, a degraded *Crabro*, is also closely connected with *Crabro* through *Rhopolum*; the mass of their characters, however, and the degradational forms existing among them, show plainly their inferiority to the other two sub-families, and their relationship to the Larridæ and Sphegidæ. They seem, as it were, to jump over the Nyssonidæ, and ally themselves more closely with the Larridæ. Of the three sub-families, the Pemphredoninæ, as seen above, afford the most mimetic forms or "comprehensive types," and by their elongated bodies and general forms, they are more closely related to the lower families of fossorial hymenoptera, while in their less essential characters they borrow the characters of the groups above them.

The Pemphredonidæ, like many other low groups, have a less number of species, and show greater generic differences than in the higher groups, whose compact cephalized forms afford less room for marked structural variation. Are these low forms made to mimic the higher types simply that they may be preserved in the life struggle, as Mr. Wallace infers the tailness Papilionidæ imitate the members of the family next below, that they may be mistaken for them? We would grant this in some cases, but such groups we must look upon as isolated forms, the connecting links of which have perished in mesozoic times; and also as *comprehensive* types,\* out of which are elaborated higher genera, differentiated into a larger number of specific forms. But it strikes us that many of Mr. Wallace's so-called mimetic forms are those related by characters of affinity and not of analogy, with the members of the succeeding and lower family. His "MIMETIC" forms are not, therefore, what we have called *comprehensive* forms. Like all closely related species of true contiguous natural groups, their forms and general

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\*This term is synonymous in meaning with the term "synthetic" as proposed by Professor Agassiz; only one is derived from the Latin, the other from the Greek. But long before, the Botanist Fries in his most philosophical Essay, used the term "synthetic" for such organisms as the apple, which tops the vegetable series, combining and concentrating in its single form all the most important characters of the Vegetable Kingdom. We therefore use Prof. Dana's term proposed in his *Crustacea* of the U. S. Expl. Exped. 1854.

habits bear a close resemblance to each other; and it need not be said that one necessarily *mimics* the other. Before dogmatizing on this subject we must wait for further information concerning the habits of these, next to the Apidæ, most interesting of all hymenoptera, and see how intimately structure is correlated with differences of habits.

PHILANTHINÆ, Dahlbom.

*Head* short and broad, being a little more than a third as broad as long; somewhat oblong transversely, with the angles rounded much more than in *Pemphredinæ* and *Crabroninæ*. Eyes narrow, oval, often indented in *Philanthus*, on the vertex reaching the middle (transversely) of the vertex, and sometimes passing a little beyond the middle; upon the vertex the distance apart of the eyes varies somewhat, as in *Cerceris* they closely approach each other. The vertex is always convex, and a little elevated, with the ocelli placed uniformly in an equilateral triangle a little below the summit of the vertex which rises a little up behind them. The front is flat and square, widening a little towards the insertion of the jaws, since the eyes approach each other a little above. The insertion of the antennæ varies both in the distance apart of their bases, though it is always considerable, and their distance from the front edge of the clypeus. This is generally above the middle line of the front. The antennæ themselves are rather long; the second joint not appressed to the front, short, and very thick, while the succeeding joints are rather long, often thickening towards the tip. The clypeus is as long as broad, subtrapezoidal.

This group, which is so clearly limited from its three neighboring groups by its broad square front, is further still more circumscribed by the two "lateral lobes" of the clypeus, which are here somewhat square and much larger than in the other groups; and by the piece on each side of the antennæ. Moreover, the group is rendered still more trenchant by the raised piece, often carinated between, and which widens below the insertion of the antennæ, which is seen so clearly in *Cerceris deserta*. Moreover the front and clypeal region are naked, which separates them from the two other groups of the family.

*Thorax* may be said to be oblong sub-cylindrical, being a little produced behind, since the meta-scutellum is less inclined than in the *Crabro*, and thus less globular than in that group. The prothorax is more continuous with the forward and lateral slope of the meso-thorax than in *Crabroninæ*. Meso-scutellum very like that of *Crabroninæ* but shorter in the main than broad, and it is besides broader behind, next to the scutellum which is longer than in *Crabro*, as is the enclosure of the

propodeum. The length of the scutellum of meso-thorax is a little more than twice included in the breadth, i. e. that part from which the sides slope to the insertion of the wings. The propodeum is either of moderate size and distinctly triangular or it occupies the whole notal portion and is rounded behind in *Philanthus*, presenting a raised area conspicuously marked and the apex is bent down abruptly.

The enclosure of propodeum is a little produced, sub-triangular, with a median impression from which the sides bulge out; its hinder edge is inclined downward at a considerable angle. Coxæ rather small, those of hind legs long and rather slender being twice as long as broad; trochanters are likewise slender being a third longer than thick.

Legs rather long; femora swelled considerably; tibiæ trigonate and well tuberculated; tarsi in ♀ very long, and lobes produced acutely, ending in long setæ in fore legs, first joint on the outside with a few lateral, long, slender spines.

Wings: primaries much as in *Crabro*, but the apex still more produced and acute, and the outer margin is not convex but straight. The outer costal is oval lanceolate being somewhat produced towards the outer end. There are four sub-costal spaces; the two middle ones sub-equal, or the second is incomplete; that is, does not reach the outer costal space, being pedunculated in *Cerceris*, and generally assuming a triangular form.

There are three median spaces, the inner or first being much produced rhomboidal, and so much so, and at the same time so rounded at the outer end, that it loses the distinct lozenge form somewhat. The second internal varies in length, width and form of the outer side and is of no use for sub-family characters. Secondaries are broad, often nearly twice as much so as in *Crabrones*; as in the *Nyssonidæ* but less so in *Pemphredoninæ*. The median or discal space is very much produced, being closed by a short recurrent beyond the outer fourth of the wing, from which the m. and s. c. terminates in the outer margin just below the apex; the first internal space is rather broad.

*Abdomen* uniformly longer than the head and thorax, the wings very convex, which is one of the best characters; the first ring almost two-thirds as broad, and nearly as broad as the succeeding, and more regularly triangular as in *Philanthus*. In *Philanthus* more than in *Cerceris*, the abdomen is flattened beneath, but this is subject to variation. The female has the last ring of abdomen thickened, with the lateral ridges above bounding an oval or triangular area.

The position of the ocelli in relation to the highest part of the

head or vertex, varies as that region is elevated and very convex, or flattened and broad longitudinally. They are all placed nearer together in a nearly equilateral triangle, not differing so much as in the *Crabrones*. In *C. deserta* when the vertex is convex, they are situated upon the top, but in other species of *Cerceris* where the vertex is more flattened the hind edge rises above them a little. In *Philanthus* when the vertex is rounded above, they are very near the top. In *Pemphredoninæ*, they are above the vertex.

The eyes in *Cerceris* are oval, whole; very slightly indented by the epicranium in *Philanthus*, when they approach one another on the vertex in *Pemphredon*, &c., they are rather smaller and within very straight and diverge towards the vertex.

The *front* is flat and square in *Cerceris*, &c. Square with the corners rounded in *Philanthus*, and also full slightly convex. In *Pemphredon*, &c., hollowed, and the sides converging in front, and in *Mellinus*\* full again, much like *Philanthus*; in *Gorites* imperceptibly depressed, triangular.

The insertion of the antennæ varies much in situation. In *Cerceris*, they are placed above the middle of the front, (especially in *C. deserta*) in *Philanthus* near the middle and far apart, in the remaining genera below the middle (especially in *Pemphredon* very near the margin, as in the *Crabrones*, where they are placed very near together. In *Cerceris* and *Philanthus* the second joint is globular and very short. In *Pemphredon*, long and slender. The remaining joints thicken considerably beyond the middle, especially in *Philanthus*. In *Pemphredon* they are smaller, shorter and of more uniform thickness throughout.

The history of the *clypeus* is very interesting, and its changes of form in the different genera are very great, as in the *Vespidæ*. In the *Cerceridæ* it varies greatly, while more constant in *Crabronidæ*.

In (*C. deserta*) the clypeus is trapezoidal, broadest and nearly straight in front and flattened. In other species of *Cerceris* it is shorter, much raised and nearly square, (I speak of the "middle lobe" of authors, for I much doubt whether the "lateral lobes" belong properly to the clypeus, but are not rather the sub-mandibular pieces of the mandible and belong to the epicranial pieces, though indeed we see no distinct suture between the two lobes in many genera, yet in *C. deserta* there is a distinct suture, and as the presence of these lobes is one of the best characters of the family, giving the breadth to the

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\* These genera of *Nyssonidæ* are introduced for the sake of comparison.



front, I suspect that they are either obsolete or concealed by the clypeus and adjacent epicranial region in the other families. We see these lobes which I take to be homologous in the Bombyces, almost replacing the mandibles in *Samia* (or exceeding them in size as in *Actias*, or hidden under the clypeus in many lepidoptera, where they are at least entirely separate from the clypeus and joined or adjacent to the piece that carries the mandibles.) In *Philanthus* it is large, longer than broad and full convex sub-hexagonal. In *Pemphredon*, it is best described as being like that of *Crabro*, but short, often hirsute, raised in the middle, and lateral lobes triangular, narrowing towards the sides. In *Mellinus* it is much shorter than broad and its base nearly aligned with the foramina. In *Gorytes*, the clypeus is larger and more than half as long as broad, and the lateral lobes do not appear, they are concealed beneath, and the foramina are obsolete, as in the Vespidae. (This foramina hardly seems to me to be a "cephalic stigma" as Dr. Clemens suggests, as it is only present when the sub-mandibular process is distinct from the side of the clypeus and the pieces that hold the eyes, as in *Cerceris*, &c., and the Lepidoptera, where the slight development of the mandibles gives greater scope for that of the process that seems to support them.)

The "epicranium" then, is actually divided into two pieces, one carrying the eyes, the other the antennæ, the tergal pieces of which is like and equivalent to the clypeus (which may be the tergite of maxillar-ring,) and the labrum (which may be the notal pieces of the mandibular-ring.) Approaching these central pieces and coming out from the sides of the eyes, are two broad, short lobe-like pieces, generally yellow colored, which are separated from the antennal pieces, on the one side, and the sub-mandibular piece below.

*Thorax.* There is great uniformity in the prothorax and the notal pieces of the meso-thorax. The propodeum varies greatly in the appearance of the enclosure, throwing aside the two sides of the scutellum, as it breaks through it. On the scutum of the meso-thorax of *Cerceris*, there are two parallel impressions, noto-lateral, which appear so plainly in Vespidae. In *Cerceris* this enclosure is triangular, and rugose longitudinally. In *Philanthus* this still preserves its form, but the suture is very indistinct. In *Pemphredon*, &c., this region is broad, flattened and horizontal, and the hinder half is suddenly bent down, and the sides are bent down from the broad sides of the propodeum; while in *Gorytes* and *Mellinus* where the hinder half is produced more than usual, and narrowed somewhat, the sides of the

scutellum are as in *Cerceris*, gradually rounded, the upper edges next to the scutum being horizontal.

In the fore wings there are generally four sub-costal spaces, except in *Pemphredon* and allies when there are but three. The wing neurulation follows in its variation the groups of genera before mentioned, and in each group the variation is very remarkably slight.

In *Cerceris* and allies the second costal space is oval lanceolate, both ends being much alike in form. The second s. c. is small, triangular and does not reach to the second costal, being pedunculated. The two lower sides of the discal space are subequal. In *Philanthus*, outer half shorter; in *Mellinus*, shorter still, and in *Gorytes* longer again. The first median is long and narrow, shorter in *Philanthus*, rhomboidal (regularly) in *Pemphredon* and *Mellinus*, and long again in *Gorytes*. In the secondaries, the median is continuous beyond its second nervules with its base, but in the remaining genera the nervure is much curved upwards after leaving its second or longest nervule. In *Philanthus* and *Pemphredon*, the second costal space is triangular, becoming oval lanceolate again in *Gorytes*. In *Philanthus*, the second sub-costal cell is sub-quadrate. In *Pemphredon*, the outer recurrent is wanting. In the second median space the outer side is nearly half shorter than the lower, and the greatest length is to the internal in *Cerceris*, *Philanthus*, while in *Pemphredon* the two sides are equal and parallel to the costa. In *Mellinus* and *Gorytes*, they oppose *Cerceris* and *Philanthus* more.

The legs are the most spined, and the tibiae most trigonate in *Cerceris*, slender in *Philanthus*, and short and slender in *Pemphredon*, and stout, approaching *Crabro* in *Gorytes*.

There are three genera in the sub-family.

The species of *Cerceris* have transversely oblong heads, the first being straight above, smooth, flat fronts, a sub-globular thorax, and long sub-cylindrical abdomen longer than head and thorax, the rings contracted, and the first ring nearly half narrower than the succeeding ones. They approach nearest to the *Vespidæ* by their toothed jaws, fronts and clypeus, globose thorax, like them they are highly colored, but they do not sting. The genus *Eucerceris* combines the characters of the two other genera.

*Philanthus* has a short head, but sub-oval transversely, since the front seen from above is convex, the thorax is much as in *Cerceris*, with the sessile abdomen shorter than in C.; the first joint nearly

as broad as the succeeding ones. Colors bright, the scutum of meta-thorax is not distinct.

*Pemphredon* and allies have the head nearly cuboidal, the thorax somewhat flattened above, the front of the head hirsute and a little hollowed at the insertion of the abdomen. The scutum of meta-thorax is distinct and ridged. The abdomen is very shortly pedicelled, the pedicel arcuated, and the abdomen, short, oval, acute. The species are black. In the head, antennæ and short clypeus they approach *Crabro* more than *Gorytes* apparently, and are very dissimilar to the others of the family, but this balance of characters puts them between *Phllanthinæ* and *Mellinus* and *Gorytes*.

*Mellinus* and *Gorytes*, have the head short again, being less than half as long as broad. *Gorytes* has a sub-triangular front, thus approaching *Crabro*. The abdomen is sub-globose, narrowing somewhat behind the middle, the meta-scutum is very distinct and large in both genera. The legs are stouter than previously, abdomen has the first ring long sub-pedicellate, widening towards the end like *Eumenes*, while the rest of the abdomen is oval. The transition in this form of the abdomen to *Crabro* is easy, since the first ring in *Gorytes* if it should be shortened and so coalesced with the rest of the abdomen as *Crabro*, would assume the triangular form of that genus. In coloration also, and the flattened abdomen, these two genera approach *Crabro*.

#### PHILANTHUS, Fabr.

*Vespa*, in part, Fabr., Syst. Ent. 362. (1775.)

*Crabro*, in part, Rossi., Mant. 1.138. (1792.)

*Philanthus*, in part, Fabr., Ent. Syst., ii, 288. (1793.)

*Simplephilus*, Jurine, Hym. 185. (1807.)

*Anthophilus*, Dahlb., Hym. Eur. i., 497. (1845.)

#### *Synopsis of the Species.*

A. ♂. Eyes converge very closely on the vertex, making the front triangular.

a. *Front not striped.*

♀. Front yellow, not striped with black; abdominal rings yellow; legs reddish.....*P. gloriosus*, Cresson.

b. *Front striped vertically with black.*

♂. On second abdominal ring two broad ovate yellow fasciæ.....*P. Sanbornii*, Cresson.

♂. On second abdominal ring two narrow acute yellow fasciæ.....*P. frigidus*, Smith.

B. Front densely hirsute.

♀. Front black above; scutellum and postscutellum yellow, abdomen with five continuous stripes.....*P. laticinctus*, Cresson.

- ♂. Front entirely yellow, densely white pilose, as is thorax.....*P. albopilosus*, Cresson.
- ♂. Eyes indented; front very broad and short, abdominal rings constricted.
- a. *Abdomen smooth, highly polished, with lunate bands.*
- ♂. Front entirely yellow; on second abdominal ring a single broad band; two dots on the basal ring.....*P. lepidus*, Cresson.
- ♂. Front black above, with a yellow spot just above the antennæ; two heavy lunate bands on second and third abdominal rings.....*P. pulchellus*, Cresson.
- ♂. Arms of three linear bands, one dorsal, on second and third abdominal rings..... *P. politus*. Say.
- ♀. Body unusually white pilose, two lateral dots on second abdominal ring.....*P. simillimus*, Cresson.
- ♀. Two broad bands on the second abdominal, on third, a single band.....*P. dubius*, Cresson.
- ♀. Small, second abdominal ring unspotted, third ring with two regular broad lunate separate fasciæ....*P. bilunatus*, Cresson.
- b. *Cerceriform species; abdominal rings being constricted, body coarsely punctured, with very broad single abdominal bands.*
- ♂ ♀. Large and stout, basal yellow band dislocated, mandibles yellow.....*P. ventilabris*, Fabr.
- ♂. Slenderer than the preceeding, a basal band, mandibles black.....*P. frontalis*, Cresson.
- ♂ ♀. Smaller, no basal band, on second and third ring a single broad band, posteriorly to them very narrow linear.....*P. punctatus*, Say.
- ♀. Abdomen with unusually broad fasciæ, two basal pairs separate, those posterior united and covering nearly the entire ring; beneath almost entirely yellow, with a large yellow spot on each side of the propodeum.....*P. flavifrons*, Cresson.
- ♀. Like the preceeding, but the propodeum is black, and the abdominal bands behind third ring narrower.....*P. albifrons*, Cresson.

In the first group (A) the head is scarcely as broad as the thorax, antennæ more filiform, not abruptly clavate; propodeum and the abdomen much broader than in the succeeding two sections; the abdomen is smooth and polished and the wings are scarcely constricted.

*Philanthus gloriosus*, Cresson.

*P. gloriosus*, Cresson, Proc. Ent. Soc. Phil., Vol. 5, p. 86. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

*Philanthus frigidus*, Smith.

*P. frigidus*, Smith, Cat. Hym. B. M. iv., p. 475, ♂. (1856).

*P. frigidus*, Cresson, Proc. v. p. 87.

Nova Scotia, (Smith). "Canada West," (Billings, Coll. Ent. Soc.).

"Dublin, N. H., Leonard," Harr., (Coll. Harr.) Conn., (Norton).

**Philanthus Sanbornii**, Cresson.*P. Sanbornii*, Cresson, Proc. v. p. 89.

Mass. (Coll. Ent. Soc., Sanborn). Brookline, Mass. July 10, Shurtleff, (Coll. B. S. N. H.) Conn. (Norton).

In the following group (*B*), the front is thickly hirsute, long and broad, the species are long and slender, basal joints of the abdomen with broad yellow bands.

**Philanthus laticinctus**, Cresson.*P. laticinctus*, Cresson, Proc. v. p. 91.

Rocky Mountains, Colorado Territory, (Ridings, Coll. Ent. Soc.).

**Philanthus albopilosus**, Cresson.*P. albopilosus*, Cresson, Proc. v. p. 91.

Illinois, (Coll. Ent. Soc.).

**Philanthus lepidus**, Cresson.*P. lepidus*, Cresson, Proc. V. p. 92.

Rocky Mountains, Colorado Territory. (Ridings, Coll. Ent. Soc.).

**Philanthus pulchellus**, Cresson.*P. pulchellus*, Cresson.

Rocky Mountains, Colorado Territory. (Ridings, Coll. Ent. Soc.).

**Philanthus politus**, Say.*P. politus*, Say, Long's 2d Exp. ii. 343. (1823.) Amer. Ent. pl. 49. (1824).*Anthophilus politus*, Dahlb., Hymn. Eur. i. 190. (1845.)*P. politus*, Cress., Proc. v. p. 94.*P. dubius*, Cresson, Proc. v. p. 96.

N. York, (Ashton). Illinois, (Lewis and Walsh, Coll. Ent. Soc. Phil.) "S. Carolina" (Dahlb.). "Penn." (Say, Smith); Mass. (Ridings). Illinois, (Lewis and Walsh). Rocky Mountains, (Coll. Ent. Soc. Phil.) Brunswick, Maine. New Jersey, Connecticut, (Norton).

We would prefer, after a careful study of the numerous male specimens, to refer them to Say's *politus*. They agree in sexual characters too closely to admit of separation.

**Philanthus simillimus**, Cresson.*P. simillimus*, Cresson, Proc. v. p. 95.

Illinois, (Lewis, Coll. Ent. Soc. Phil.).

**Philanthus bilunatus**, Cresson.*P. bilunatus*, Cresson, Proc. v. p. 97.

Mass., (Stratton). Illinois, (Walsh, Coll. Ent. Soc. Phil.) Illinois, New York, Conn., Mass., (Norton). Mass. (Sanborn). Brunswick, Me., very abundant in August on flowers.

Some specimens much larger than others have unbroken continuous bands on the abdomen. The supra antennal yellow spot often disap-

pears. The ♂ is more slender bodied, the two lunate bands do not contract so much as in ♀.

***Philanthus solivagus*, Say.**

♀. Head large, much as in large specimens of *P. bilunatus*, finely puncto-striated, striated on the front, below, a broad lunate yellow spot, and between the antennæ a triangular yellow small spot just above the base of the clypeus, beyond and on the orbits, entirely yellow; two black dots on each side of the middle of the clypeus. Mandibles yellow, black at tip. Antennæ with the middle joint of the scape yellow, base of the flagellum reddish beneath, not black. Body usually dull colored, being densely but finely punctured; prothorax yellow, thorax entirely black; postscutellum black, propodeum densely punctured, a thin fine pale grey hairs. Wings with pale ferruginous nervules, as usual. Two fore femora black, tipped with yellow, extending inwards on the inside, tibiæ and tarsi yellow, hind tibiæ shaded with black towards the tip; tarsi brownish, fuscous at tip, very spinulose. Abdomen smooth, not polished much, minutely punctured, basal ring with a large broad continuous yellow band, sides sinuate; on succeeding segments a narrow linear band, nearly meeting on the middle of the body, followed by three broad continuous bands; tip with two yellow spots on each side, fuscous on edges. Length, .52 inch.

Conn., (Norton). "Maine," common in July and August, (Ray), Brookline, Mass., (Shurtleff, Coll. B. S. N. H.). Milton, Harr., (Harris Coll.).

Allied more closely to *P. bilunatus* than any other species. It is quite peculiar, with its dull colored minutely punctured body, its black thorax and the dark hind tarsi.

***Philanthus ventralis*, Fabr.**

*P. ventralis*, Fabr., Ent. Syst. Suppl. p. 268. (1798).

"Coqueb. Ill. Icon. p. 96, pl. 22, fig. 2." (1804).

Say, Amer. Ent. pl. 49. (1824.)

*Anthophilus ventralis*, Dahlb., Hym. Eur. i. p. 497. (1845).

*P. ventralis*, Smith, Cat. Hym. B. M. iv. p. 474. (18.6).

Cresson, Proc. v. p. 98.

"N. Carolina," (Dahlb., Hentz., Coll. B. S. N. H.). Middle States, Colorado Territory, (Coll. Ent. Soc. Phil.). "Cambridge," July 25, Harris, (Coll. Harris). Northern Texas, (Norton). Texan specimens do not differ from northern specimens.

***Philanthus frontalis*, Cresson.**

*P. frontalis*, Cresson, Proc. v. p. 99.

Rocky Mountains, Col. Terr., (Ridings, Coll. Ent. Soc. Phil.).

***Philanthus punctatus*, Say.***P. punctatus*, Say, Long's Second Exp. ii. p. 342. (1824).*Anthophilus gibbosus*, Dahlb. Hym. Eur. i. p. 192. (184.)." *Cheilopogonus punctiger*, Westw., Zool. Mag. v. p. 441, pl. 22, fig. 4." (1833).*P. punctatus*, Smith, Cat. B. M. iv. p. 474. (1856).

Cresson, Proc. v. p. 100. (1865).

Middle States, (Coll. Ent. Soc. Phil.). New York, (Angus).

***Philanthus albifrons*, Cresson.***P. albifrons*, Cresson, Proc. v. p. 101.

Rocky Mountains, Col. Terr., (Ridings, Coll. Ent. Soc. Phil.).

***Philanthus flavifrons*, Cresson.***P. flavifrons*, Cresson, Proc. v. p. 102.

Rocky Mountains, Col. Terr., (Ridings, Coll. Ent. Soc. Phil.).

## DESIDERATA.

***Philanthus barbatus*, Smith.***P. barbatus*, Smith, Cat. Hym. B. M. iv. p. 473. (1856).

Cress. Proc. v. p. 103.

"North America," (Smith).

***Philanthus crabroniformis*, Smith.***P. crabroniformis*, Smith, Cat. Hym. B. M. iv. p. 474.

Cresson, Proc. v. p. 104.

"California," (Smith).

**EUCERCERIS, Cresson.***Eucerceris*, Cresson, Proc. Ent. Soc. Phil. v. (1865.)*Synopsis of the Species.*a. *Posterior abdominal bands narrow linear, or obsolete.*♂ ♀. A broad yellow patch on the propodeum; abdominal rings with linear unbroken bands, that on third ring enclosing a broad linear black dorsal band; meta-scutellum and often the scutellum yellow....***E. zonatus*, Cresson.**♂ ♀. Three posterior abdominal bands obsolete, thorax black, as is also the propodeum.....***E. laticeps*, Cresson.**b. *Each abdominal ring with a single broad yellow band.*♂. Front entirely yellow, abdominal bands unusually broad, femora reddish.....***E. superbus*, Cresson.**♀. Front with three yellow vertical bands, two disconnected linear small yellow bands on the second ring, femora black.....***E. flavocinctus*, Cress.**♂. Front very narrow, especially above; femora yellow, with a black line above; propodeum black.....***E. cingulatus*, Cresson.**♂. Front trilineated vertically with yellow, clypeus fusco-testaceous, femora red; propodeum four-spotted, a yellow dislocated mesial V.....***E. fulvipes*, Cresson.*****Eucerceris zonatus*, Cresson.***Philanthus zonatus*, Say, Quart. Rep. ii. p. 79. (1823.)

Amer. Ent. pl. 49. (1824.)

*Eucerceris zonatus*, Cresson, Proc. v. p. 105. (1865.)

"Arkansas," Say. Illinois, (Coll. Ent. Soc. Phil.).

**Eucerceris laticeps**, Cresson.

*E. laticeps*, Cresson, Proc. v. p. 107. (1865.)  
Massachusetts, (Ridings, Coll. Ent. Soc. Phil.).

**Eucerceris flavocinctus**, Cresson.

*E. flavocinctus*, Cresson, Proc. v. p. 109. (1865.)  
Rocky Mountains, Col. Terr., (Ridings, Coll. Ent. Soc. Phil.).

**Eucerceris cingulatus**, Cresson.

*E. cingulatus*, Cresson, Proc. v. p. 110. (1865.)  
Rocky Mountains, Col. Terr., (Ridings, Coll. Ent. Soc. Phil.).  
"This may be the ♂ of *E. flavocinctus*" Cresson.

**Eucerceris fulvipes**, Cresson.

*E. fulvipes*, Cresson, Proc. v. p. 111. (1865.)  
Rocky Mountains, Col. Terr., (Ridings, Coll. Ent. Soc. Phil.).

**Eucerceris canaliculatus**, Cresson.

*Phlanthus canaliculatus*, Say, West. Quart. Rep. ii. p. 79. (1823.)  
Amer. Ent. pl. 49. (1824.)

"Arkansas," (Say).

**CERCERIS**, Latreille.

*Phlanthus*, in part, Fabr., Ent. Syst. ii. p. 288. (1793.)  
*Cerceris*, Latr., Hist. Nat. Crust. et. Ins. xiii. (1804.)  
*Diamma* and *Didesmus*, Dahlb., Hym. Eur. i. 225 and 502. (1845.)

*Synopsis of the Species.***A. Species of large size, wings clouded, clypeus exerted, raised and forked or deeply excavated.**

- ♂. Orbits yellow, femora black. ♀. Body black,  
front trimaculate.....**C. fumipennis**, Say.
- ♂. Femora tipped with red; front bilineate, clypeus  
raised, yellow.....**C. clypeata**, Dahlb.
- ♀. A square black mesial sinus in yellow band on  
second abdominal ring, basal ring entirely  
black; front entirely yellow.....**C. venator**, Cresson.
- ♀. Front reddish, concolorous with the legs; propo-  
deum reddish, with a mesial triangular black  
spot; abdomen red; four yellow pale patches,  
two on each two basal segments; clypeus raised,  
deeply excavated.....**C. bicornuta**, Guér.
- ♀. Clypeus bifurcate, very prominent, abdomen yel-  
low, with a broad basal triangular spot on each  
ring.....**C. biungulata**, Cresson.
- ♀. Front entirely yellow, femora yellow and red; two  
yellow lateral spots on the basal abdominal ring  
above.....**C. sexta**, Say.
- ♀. Clypeus with a square black spot, femora red, con-  
colorous with entirely red ferruginous basal  
ring.....**C. vicina**, Cresson.



*B.* Species small, not over half an inch long, wings clear, clypeus entire, occasionally scarcely raised.

- ♂. Basal ring red, supra-clypeal piece yellow; femora black, tipped with yellow; scutellum bipunctate.....*C. rufinoda*, Cresson.
- ♀. Two basal abdominal rings red, posteriorly black.....*C. rufopista*, Smith.
- ♀. Femora rust red, supra-clypeal piece black, abdomen banded with yellow.....*C. Blakei*, Cresson.
- ♀. Scutellum bipunctate, black species; femora black, broadly tipped with yellow, basal ring an interrupted yellow band.....*C. finitima*, Cresson.
- ♂. Abdomen red posteriorly, two large acute connate yellow spots.....*C. bilunata*, Cresson.
- ♀. Small, black, basal abdominal ring yellow, antennæ red, anterior femora yellow, posterior pair black, tipped with yellow.....*C. cubensis*, Cresson.
- ♀. Front black above the clypeus, which is mostly yellow, propodeum bimaculate with yellow, antennæ blackish, legs black.....*C. nigrescens*, Smith.
- ♀. Antennæ light fuscous, femora yellow.....*C. occipitomaiculata*, Pack.
- ♀. Clypeus smaller, raised, with two yellow dots, basal abdominal ring yellow.....*C. dentifrons*, Cresson.
- ♂. Clypeus broad, round, smooth, front yellow; basal abdominal ring black; fore femora tipped with yellow, posterior pair yellow at base.....*C. deserta*, Say.
- ♂. Body more closely punctured, antennæ redder than in *deserta*.....*C. imitator*, Cresson.
- ♂. Stouter, clypeus rounder, hind femora entirely black.....*C. compar*, Cresson.
- ♀. Femora red; clypeus black, with two small geminate dots.....*C. fulvipes*, Cresson.
- ♀. Body stouter, head larger than preceding; clypeus lunate yellow, basal ring of abdomen black.....*C. compacta*, Cresson.
- ♂. Body very short, front entirely yellow, two pairs of anterior femora reddish, hind edge of first abdominal ring fuscous; thorax black.....*C. californica*, Cresson.
- ♂. Orbits yellow, supra-clypeal rugæ black, basal ring of abdomen black, lateral streaks on third, femora black, tipped with yellow, a small species.....*C. Kennicottii*, Cresson.
- ♂. Second abdominal ring black, front yellow; femora yellow.....*C. insolitus*, Cresson.

***Ceroeris fumipennis*, Say.**

*C. fumipennis*, Say, Bost. Jour. Nat. Hist. i. p. 381. (1837.)

*C. cincta*, Klug et Erich., Dahlb. Hym. Eur. i. p. 204 ♂. (1845.)

Smith, Cat. Hym. Br. Mus. iv. p. 438. (1856.)

*C. fumipennis*, Cresson, Proc. v. p. 113. (1865.)

Mass., Middle States and Louisiana, (Coll. Ent. Soc. Phil.) Florida, District Columbia, (Norton).

**Cerceris clypeata**, Dahlb.

*C. clypeata*, Dahlb., Hym. Eur. i. p. 221. (1845.)

Cresson, Proc. v. p. 114. (1865.)

Mass. and Middle States, (Coll. Ent. Soc. Phil.) Maine, August on flowers, Mass., Conn., New York, District of Columbia, (Norton). Varies greatly in the length of the clypeus, in some being half as long as in others.

**Cerceris venator**, Cresson.

*C. venator*, Cresson, Proc. v. p. 116. (1865.)

Middle States, Kansas, Louisiana, (Coll. Ent. Soc. Phil.). Mass., (Sanborn). District of Columbia, (Norton). New York, (Angus).

**Cerceris bicornuta**, Guérin.

*C. bicornuta*, Guérin, Icon. Règ. Anim. p. 443.

Smith, Cat. Hym. Br. Mus. iv. p. 466. (1856.)

Cresson, Proc. v. p. 117. (1865.)

Middle States and Louisiana, (Coll. Ent. Soc. Phil.). "New Orleans, Georgia and Delaware," (Smith). Brookline, Mass., Shurtleff, (Coll. B. S. N. H., Harris Coll.). New York, Maryland, Penna., (Norton).

**Cerceris biungulata**, Cresson.

*C. biungulata*, Cresson, Proc. v. p. 118.

Rocky Mountains, Colorado Territory, (Ridings, Coll. Ent. Soc.).

**Cerceris sexta**, Say.

*C. sexta*, Say, Bost. Jour. Nat. Hist. i. p. 382. (1837.)

Smith, Cat. Hym. B. M. iv. p. 465. (1856.)

Cresson, Proc. v. p. 119. (1865.)

"Missouri," (Say). Rocky Mountains, Colorado Territory, (Coll. Ent. Soc. Phil.). Kansas, (Norton).

**Cerceris vicina**, Cresson.

*C. vicina*, Cresson, Proc. v. p. 120. (1865.)

Rocky Mountains, Colorado Territory, (Coll. Ent. Soc. Phil.).

**Cerceris rufinoda**, Cresson.

*C. rufinoda*, Cresson, Proc. v. p. 121. (1865.)

Rocky Mountains, Colorado Territory, (Coll. Ent. Soc. Phil.).

**Cerceris rufopicta**, Smith.

*C. rufopicta*, Smith, Cat. Hym. Br. Mus. iv. p. 467. (1856.)

Florida, (Norton).

**Cerceris Blakei**, Cresson.

*C. Blakei*, Cresson, Proc. v. p. 121. (1865.)

Georgia, (Blake, Coll. Ent. Soc. Phil.).

**Cerceris finitima**, Cresson.

*C. finitima*, Cresson, Proc. v. p. 122. (1865.)

Illinois, (Lewis, Coll. Ent. Soc. Phil.).

***Cerceris flavocostalis*, Cresson.***C. flavocostalis*, Cresson, Proc. iv. p. 153; v. p. 123. (1865.)

Cuba, Gundlach.

***Cerceris triangulata*, Cresson.***C. triangulata*, Cresson, Proc. iv. p. 154; v. p. 123. (1865.)

Cuba, Gundlach.

***Cerceris bilunata*, Cresson.***C. bilunata*, Cresson, Proc. iv. p. 155; v. p. 123. (1865.)

Cuba, (Coll. Ent. Soc. Phil.).

***Cerceris festiva*, Cresson.***C. festiva*, Cresson, Proc. iv. p. 156; v. p. 123. (1865.)

Cuba, Gundlach.

***Cerceris cubensis*, Cresson.***C. zonata*, Cresson, Proc. iv. p. 156. (1865.)*C. cubensis* Cresson, Proc. v. p. 123. (1865.)

Cuba, (Coll. Ent. Soc. Phil.).

***Cerceris nigrescens*, Smith.***C. nigrescens*, Smith, Cat. Hym. B. M. iv. p. 466. (1866.)

Cresson, Proc. v. p. 123. (1865.)

Nova Scotia, (Smith). Canada West, Saunders. Rocky Mountains, Colorado Territory, (Coll. Ent. Soc. Phil.). "North Conway, N. H., Aug, 7." Harris, (Coll. Harr.).

***Cerceris occipitomaiculata*, n. sp.**

♂. Head more highly polished than in *C. nigrescens*, to which it is most closely allied; orbits paler yellow than in *nigrescens* but with the same arrangement of colors; inter-antennal ridge covered with a yellow triangular spot; clypeus very square, angular, depressed, being much larger, longer, front edge very slightly excavated, minutely dentate, six-sided, sides angular. Mandibles yellow, black at tip; scape yellow beneath, black above, flagellum pale mahogany reddish, beneath; brownish-black above, tips above pale, somewhat yellowish. Body marked as in *C. nigrescens*, but the spots and bands are considerably heavier; occiput laterally with a yellow spot. Two heavy yellow spots on the prothorax, meso-scutum hairy and more thickly punctured than in *C. nigrescens*, post-scutellum yellow; enclosure very minutely and finely striated, much more so than in *C. nigrescens*; posteriorly the propodeum is not striated, though as coarsely punctured as in the preceding species; tegulæ entirely yellow, where in the other species they are partially black behind. Wings the same. Femora yellow, fore pair blackish behind; hind pair reddish at tip, tibiæ yellow, hind tibiæ fuscous at tip; tarsi yellow, hind tarsi fuscous. Abdomen marked and punctured much as in *C. nigrescens*, but the

supra-anal area is narrower and a little smaller than in the species above mentioned.

Length, .35 inch.

Kansas, (Norton).

Differs in the pale yellow legs, the larger square clypeus, and the pale antennæ. The specimens of *C. nigrescens* I have compared it with, came from Colorado Territory and also the New England States and Canada.

***Cerceris dentifrons*, Cresson.**

*C. dentifrons*, Cresson, Proc. v. p. 124. (1865.)

Middle States, (Coll. Ent. Soc. Phil.).

***Cerceris deserta*, Say.**

*C. deserta*, Say, Long's 2d Exp. ii, p. 343. (1824.)

Smith, Cat. Hym. B. M. iv. p. 465. (1856.)

Cresson, Proc. v. p. 125. (1865.)

Mass., (Shurtleff, Coll. Harr., Sanborn). Maine, abundant in August, with varieties.

*C. imitator*, Cresson, Proc. v. p. 125. (1865.)

As this variety differs only in its coarser sculpturing, not differing in other characters usually of specific value in this group, it is united with the *deserta* of Say.

***Cerceris compar*, Cresson.**

*C. compar*, Cresson, Proc. v. p. 126. (1865.)

Illinois, (Coll. Ent. Soc. Phil.)

***Cerceris fulvipes*, Cresson.**

*C. fulvipes*, Cresson, Proc. v. p. 126. (1865.)

Delaware, Illinois, (Coll. Ent. Soc. Phil.) Conn., (Norton).

***Cerceris compacta*, Cresson.**

*C. compacta*, Cresson, Proc. v. p. 127. (1865.)

Middle States, (Coll. Ent. Soc. Phil.) New York, District of Columbia, (Norton.)

***Cerceris californica*, Cresson.**

*C. californica*, Cresson, Proc. v. p. 128.

California, Ulke, (Coll. Ent. Soc. Phil.).

***Cerceris Kennicottii*, Cresson.**

*C. Kennicottii*, Cresson, Proc. v. p. 128. (1865.)

Louisiana, Kennicott, (Coll. Ent. Soc. Phil.).

***Cerceris insolita*, Cresson.**

*C. insolita*, Cresson, Proc. v. p. 129. (1865.)

Illinois, Lewis, (Coll. Ent. Soc. Phil.).

## DESIDERATA.

***Ceroeris frontata*, Say.**

*C. frontata*, Say, West., Quart. Rep. ii. p. 80, ♀. (1823.)  
Cresson, Proc. v. p. 129.

Arkansas, (Say.)

***Ceroeris bidentata*, Say.**

*C. bidentata*, Say, West. Quart. Rep. ii. p. 80, ♀. (1823.)  
Cresson, Proc., v. p. 130.

***Ceroeris verticalis*, Smith.**

*C. verticalis*, Smith, Cat. Hym. iv. p. 466. (1856.)  
Cresson, Proc. v. p. 130.

Georgia, (Smith.)

***Ceroeris elegans*, Smith.**

*C. elegans*, Smith, Cat. Hym. B. M. iv. p. 467.  
Cresson, Proc. v. p. 131.

East Florida, (Smith.)

***Ceroeris Dufourii*, Guér.**

*C. Dufourii*, Guérin, Icon. Règ. Amin. iii. p. 444. (1838.)  
Cresson, Proc. v. p. 131.

New Orleans, (Guérin.)

***Ceroeris lævigata*, Smith.**

*C. lævigata*, Smith, Cat. Hym. B. M. iv. p. 465.  
Cresson Proc. v. p. 132.

"St. Domingo," (Smith.)

***Ceroeris Perboscii*, Guér.**

*C. Perboscii*, Guérin, Icon. Règ. iii. p. 444. (1838.)  
Smith, Cat. Hym. B. M. p. iv. 448.  
Cresson, Proc. v. p. 132.

"Bay of Campeche," (Guérin.)

## Subfamily CRABRONINÆ.

*Head* large, cuboidal, being seldom less than a third shorter than long, most often narrowing behind in ♂; the vertex broad and flattened, the eyes very broad, oval and extending to or slightly beyond the middle of the vertex, ocelli placed generally in an equilateral triangle on the vertex in its middle. The eyes are very much increased in width, encroaching very much on the front, and often also on the side opposite the ocelli, presenting a very slight sinus, thus making the front area of the head broadly triangular and concave, which is the best and most constant character of the group. Their distance apart on the vertex varies in the different genera. The front slopes gradually or suddenly from the vertex into a broad, rather deep groove for the reception of the scape of the antennæ, the sides are often thickly

covered with silvery, short, stiff pubescence. The clypeal region including the *clypeus* and the two lateral lobes, which can sometimes be distinguished, is closely covered with a silvery pubescence which in certain lights is of a deep golden hue. The clypeus itself is always shorter than broad, ridged in the middle. The front edge is often naked and thickened or produced, carinate and subacute, and the lateral lobes are very short, being transversely almost linear, of course being much wider in ♀ than in ♂. Antennæ, placed much below the middle of the front, short, generally thickened towards the tip, second joint uniformly long, and appressed towards front in the groove, cylindrical, rarely flattened in ♂. Mandibles rather large, of even width throughout, which is another good character. Mouth-parts well developed, varying much in the length and size of *lingua* and *maxillæ*.

Thorax sub-globular, being convex, rounded above and on the sides, much more globular than in *Nyssonidæ* and *Philanthinæ*. The scutellum of the prothorax is distinct from the scutum, and is large, broad, often angulated in front on the sides. Meso-scutum square, about as long as broad, convex, behind narrowing slightly and slightly concave opposite the patagia, and angulated just beyond them, before reaching the hind edge. Scutellum is transversely oblong, being about one-third as long as broad, that is, the notal portion which is raised and distinct from the sides, sometimes it is (*Thyreopus*) half as long as broad, and not half as wide as thorax itself. Meta-scutellum one-half to one-fourth as long as the meso-scutellum, being transversely linear.

The propodeum is large, triangular or sub-trapezoidal, since it narrows more or less behind. It is bent rather abruptly downwards from within the middle, being nearly vertical, and this character aids in giving the globular form to the whole thorax. It is unarmed.

Fore wings long and rather narrow, the apex somewhat produced, and the outer margin long and rather oblique. The absence of the 2—3 outer subcostal and median spaces is the best distinction in this group and the *Pemphedoninæ*, since they are present in *Nyssonidæ* and *Philanthinæ*. The costal space is angulated-oval, being truncated at the outer side, and the medio-subcostal recurrent, anastomoses in or near the middle of the costal space; first subcostal is long oblong, the outer ones obsolete. First median cell elongated, rhomboidal or lozenge-shaped, the outer side is generally parallel with the outer-lower side of the costal space, the outer side of first subcostal which is between, being more transverse, being almost perpendicular to the costa of the

wing. The outer median space is obsolete. The second internal space is long and narrow, the outer side being nearly always perpendicular to the costa, or bent, the upper part being oblique.

The secondaries are long and narrow; the discal cell is large, extending beyond the middle of the wing, closed without by a recurrent which is bent outwards in the middle; the internal cell is narrow and short.

Legs short and stout, fore-tibiæ often armed with vexillate expansions, and the tarsi broad, flat and short, with lateral setæ on joints of tarsi; the middle and hind femora are swelled somewhat, tibiæ subtrigonal, rather stout and generally with tubercles terminating in setæ, arranged for the most part in irregular rows. The hind tarsi are rather stout, the lateral lobes of the tarsi terminate in setæ and are somewhat produced.

Abdomen sessile, short, elongated oval, somewhat flattened, ♀ much broader and shorter than ♂. The form of the first ring is very persistent, being triangular, broad next to the second, the rings are very continuous with the centre of the sides of the abdomen. The terminal ring in ♀ is often mucronate, the flat triangular area above being bounded on each side by a lateral carina. Coloration, black, basal joints of palpi, tibiæ, prothoracic scutellum and meso-scutellum, and lateral oval spots on the sides usually yellow.

*Sexual differences.*—The family form is most persistent in ♀♀. The variation being greater in ♂, the head is narrowed behind, and in front narrowing towards jaws, making the jaws shorter in ♂ and the clypeus much narrower; ♂ most slender bodied, the legs (fore) simple, and the abdomen longer, tip simple. The ♂ is considerably smaller than the ♀.

*Eyes* in *Anacrabro* are very broad above and have a distinct sinus opposite the ocelli, they extend a little behind the middle of the head as usual. The situation and relative distance apart of the *ocelli* do not afford good generic characters in these genera, since there is great constancy in these respects. They are farthest apart and arranged in a low triangle in *Anacrabro*. In *Blepharipus* they are placed in a more equilateral triangle. The ocelli often vary in relative size, none of the three being absolutely equal in size; this seems to be an individual variation.

*Front* in *Anacrabro* is hardly triangular, the lower region of the groove being but little more than one-half as wide as the triangular region above, which is narrower than usual, and the sides are not con-

tinuous forming that triangular region peculiar to the Crabrones. In *Blepharipus*, the front is still rather narrower.

There is but slight variation in the clypeal region. In *Anacrabro* the portion covered with pubescence is short, and has the appearance of being deeply indented in the middle, since the front edge is thickened, and full, naked, and there is no perceptible ridge above. In *Blepharipus* it is much longer and ridged distinctly, and in *Crabro* it is much produced in front and somewhat pointed; in the other genera it varies very slightly. In the antennæ of our genera there is but little difference. In *Anacrabro* they are shortest and thickest. In the more typical species of *Thyreopus* they are flattened, and the second joint shorter than usual and flattened, in the other aberrant species, the antennæ are long and slender cylindrical.

**ANACRABRO**, nov. gen.

Body short and flattened, thorax globular, short, head and thorax together equalling in length the flattened short abdomen, which is concave beneath.

Head very short, being (in a transverse sense) elliptical oblong, much less than one-half as long as broad, since the hinder region posterior to the eyes, is not developed as usual in this subfamily. Eyes broad, truncated above and regularly rounded below the ocelli; the triangular front very small and short, rapidly narrowing towards the antennal groove. Clypeus very short, appearing broadly indented in front, the front margin rounded and naked in front where it is suddenly deflexed, presenting a triangular squarely truncated face. Antennæ much as usual in the subfamily, thickening a little towards the tip, joints unusually cylindrical and equal, second joint hardly longer than the others. Ocelli placed in a low triangle. Palpi and lingua shorter and thicker than usual.

Thorax not much longer than broad, subglobose. Meso-scutum shorter than broad; flanks of the meso-thorax square in front, the sides being straight and suddenly deflexed beneath.

Wings shorter and broader than usual, pterostigma large and distinct; second costal space large; first median much shorter than usual; costal and submedian recurrents not opposite each other, the submedian being placed much nearer the base of the wing than the costal recurrent; median nervure joining the first subcostal within the middle of the space, (in *Crabro* the juncture takes place at the outer end of the space.)

Legs not so stout as usual, joints simple, hardly dilated as much as



usual; fore femora slightly expanded; fore tibiæ naked; tarsi finely ciliated; hind tibiæ with fine setiferous tubercles especially abundant along the angles; first joint of tarsi much shorter than the remaining joints.

Abdomen equalling the length of the head and thorax together, broad and much flattened, more than half as broad as long, beneath unusually concave, basal ring broad and short; tip rounded spatulate.

The remarkably short head, broad, short body, the deflexed clypeus, the short triangular front, unidentate mandibles, the flattened fore femora, angulated prothorax and meso-thoracic flanks, the concave under side of the abdomen, the great differences in the neuriation and its undersized species will easily serve to distinguish this interesting genus. In its narrow clypeal region, as compared with the broad antennal region, its short compact form, its evenly, closely jointed antennæ and short cubical thorax it reminds us of *Oxybelus*, though not closely related by affinity, being an isolated generic form standing out from the line connecting *Crabro confluenta* and its allies, with *Cerceris*.

The front of the head instead of being oblong elliptical as usual in this group, is round, the clypeal region is not so broad as in *Crabro*, while the antennæ are inserted much farther apart. Seen laterally the thorax is no longer than high; the meta-thorax is suddenly vertically deflexed, and is thus parallel with the front of the prothorax, where usually in *Crabro* it falls away at a less angle towards the insertion of the thorax.

In the wings the first sub-costal space is long and crescent-shaped, not lozenge-shaped as usual. The first median space is rhomboidal and smaller than usual, instead of being as usual long and lozenge-shaped, and its outer end terminates in the middle of the wing, while in the genus *Crabro* and allies, it terminates at or near the outer third of the wing; first submedian space does not extend to the middle of the first median, being very short; second submedian is much longer than first submedian space, whereas it is usually much shorter, and lanceolate in form, and is externally regularly rounded, not truncated as usual. The second median space partially obsolete externally, more regularly rhomboidal than usual, and the two upper sides forming a nearly straight line. In the secondaries the first submedian space is one-half shorter than in the other genera.

**A. ocellatus**, n. sp.

♀. Whole body coarsely punctured, more so than usual in *Crabro*.

Head entirely black including the clypeal region and the antennæ; mandibles black, growing corneous towards the tips; orbits and clypeal regions silvery. At the lower angle of the meso-scutum on the flanks is a round yellow dot (tubercle), produced upwards into a linear tail-like expansion, pupilled with black; on the meta-scutellum is a long linear transverse yellow band, which spreads out still further on each side of the posterior edge. Thorax black, coarsely punctured, as is the head and abdomen. Enclosure of propodeum transversely almost linear, surface with about six deep mitre-shaped fossæ enclosed between high ridges, below irregularly ridged.

Wings clouded on the outer half. Legs with black coxæ and femora, fore femora streaked with yellow beneath and tipped with yellow; tibiæ and tarsi yellow, streaked on the edges with fuscous, especially the fore tibiæ which have a broad dark line on the inner side. Abdomen black, nearly the whole of the upper surface black, the yellow very lateral spots hardly extending on to the tergum. The lateral fasciæ occur on the basal five rings and are acutely triangular in form, the sharp apex usually terminating on the outer third of the upper surface of each ring, at their bases expanding covering the whole length of the ring at the juncture of the tergal portion with the sternite, on their posterior margin deeply excavated, sometimes on the fifth, the fasciæ spread out and bathe the hinder edge of the entire upper surface of the ring in yellow; tip black, slightly hirsute. Beneath black; edges of the rings piceous.

Length of body, .24—.32; head and thorax together, .17; abdomen .15 inch.

Mass., (Sanborn and Norton, Coll. Ent. Soc. Phil.) Illinois, (Coll. Ent. Soc. Phil.)

Not only by its greatly flattened, short elliptical body, and short, broad large jaws, and its peculiar neurulation can this species be easily recognized, but also its jet black coarsely punctured body, the single narrow linear meta-scutellum with its yellow streak, and the abdominal fasciæ being placed on the extreme side, and its entire structure while in some respects reminding us of *Oxybelus*, clearly forms a connecting link uniting *Pemphredo* and its allies with *Crabro*.

This species is liable to considerable variation in the size of the abdominal fasciæ, which are often greatly enlarged and show a tendency to approach each other on the tergal surface, and also vary in width.

**CRABRO, Fabr.**

♂. Head sub-triangular, being nearly as long as broad, and half as wide behind as in front. Vertex broad and flat, the ocelli placed in an equilateral triangle in the middle. Eyes not generally reaching to the middle of the vertex, broad oval. The whole front of the head broad as high, narrowing slowly towards the insertion of the mandibles; the front of the epicranium is vertical, its plane being exactly at right angles to the vertex, equilaterally triangular, and the groove is large and not very deeply cut. ♀. Head sub-cuboidal, hardly narrowing behind, nearly as long as broad. Ocelli placed a little in advance of the middle of the vertex, the eyes above do not reach the middle, they are broader below than in the ♂, so that the sides of the front hardly narrow towards the insertion of the jaws, making the front of the head quadrilateral. Antennæ filiform in both sexes, second joint long as half the breadth of the head, in the ♂ it is somewhat swollen in the middle, more slender in the ♀, the remaining joints are hardly swelled in the middle. Clypeus much raised in the middle, but a third shorter than broad and rounded angularly in front in ♂; in ♀ very short and broad, being nearly two-thirds shorter than broad. Mandibles in ♂ even width throughout, bidentate, the lower smallest; in ♀ the jaws narrow somewhat towards tip.

Thorax oval, subglobose, flattened above. Meso-scutum nearly square, as long as broad, straight behind, and the sides are straighter, not rounded towards the hind margin as usual; scutellum is very continuous with the scutum. It presents a lanceolate acute transverse area. The pronotum rounds suddenly vertically downwards. Flanks full and convex, as usual.

Primaries: pterostigma narrow, indistinct; second costal has the sub-costal and costal recurrent placed in the middle. The first median cell lozenge-shaped, the lower side of the outer half of the space being a little shorter than the upper. The second internal space is long, the outer side being straight and curved a little towards each nervure.

♂. Legs, tibiæ smooth, coxæ sub-triangular, fore femora swelled, smooth, flattened beneath, the depressed area sometimes terminating in a spine near the middle of the joint. The tibiæ are rather short, flattened beneath, and terminating in a broad recurved spine. Tarsi flattened in all the legs. Fore tarsi, first joint a third longer than the remaining ones, terminating, as do the rest, in a slight spine. The remaining ones are about half as long as broad. Hind femora tapering more than usual towards the extremity. Tibiæ smooth, ending in two

unequal large broad spines. Tarsi short, first joint hardly shorter than remaining joints.

♀. Fore femora trigonate, as usual, not being flattened. Tibiæ smooth, large, terminating in short spines, with a slender spur. Tarsi long and slender. First joint of tarsi spinulose without, shorter than the remaining joints. Middle and hind tibiæ swollen and slightly tuberculated on the outside, the tubercles are hardly spinose and not arranged in rows on the hind pair.

♂. Abdomen a little shorter than the head and thorax together. It is broad and flattened, and slightly arcuated. Abdomen tip subacute, tip triangular with an incomplete sub-basal depression above. ♀ broader than ♂; tip mucronate, triangular above, depressed, bounded by lateral ridges.

The body is in places under the limbs covered with a long silky pubescence. The head does not narrow so rapidly behind, and the second joint of the antennæ is not so long; the simple fore legs, the more flattened and broader thorax, the mucronate broad flattened abdomen at once distinguish it from *Thyreopus* or from *Ceratocolus*.

The above description applies to the more typical species of the group which *Crabro 6-maculatus* represents.

Group (A) of which *C. interruptus* St. F. is the type, comprises *Cerceris*-like species, and connects with *Cerceris* by *Anacrabro*.

#### *Synopsis of the Species.*

#### A. Species of moderate size, bodies coarsely punctured.

##### a. Basal ring of abdomen with fasciæ.

- ♂. Head trapezoidal, sides narrowing behind, antennæ untoothed; abdomen with three pairs of fasciæ and two terminal bands. ♀. Head cubical, body broad and short; antennæ short.....*C. interruptus*, St. F.

##### b. Femora sinuate on edge.

Front elongated, thorax entirely black.....*C. producticollis*, Pack.

- ♂. Four basal joints of flagellum dentate; three pairs of fasciæ and three terminal bands. ♀. No yellow markings on meso-notum, antennæ slender.....*C. bellus*, Cresson.
- ♂. Head narrow, flagellum not dentate; head and thorax very black.....*C. atrifrons*, Cresson.
- ♂. Head broad; mandibles yellow; antennæ not dentate; abdomen with five terminal bands; two dots on basal ring.....*C. odyneroideus*, Cresson.

##### c. Basal ring immaculate; of small size.

- ♂. Antennæ once-toothed; abdomen with three terminal bands.....*C. honestus*, Cresson.
- ♂. Antennæ many-toothed; abdomen with two terminal bands.....*C. gracilissimus*, Pack.

**B.** Of large size; head large transverse, front golden; basal ring of abdomen with two subtriangular sinuate bands.

♀. Femora yellow and rufous; two spots on meso-flank.....*C. 10-maculatus*, Say.

♀. Femora rufous, no supplementary spot behind the tubercle; base of abdomen fuscous.....*C. aurifrons*, Smith.

♀. Head cubical; body stout: meso-scutellum entirely rufous yellow, abdomen with four very contiguous fasciæ.....*C. cubensis*, Cresson.

**C.** Head very transverse, abdomen as long as head and thorax together, body elongated, 2—3 pairs of terminal bands; front silvery, clypeus often subcupreous.

♂. Head narrow, abdomen with three terminal bands.

♀. Abdomen broad, flattened.....*C. ruffemur*, Packard.

♂. Head broad; abdomen with two terminal bands.

♀. Tip narrow compressed, channelled deeply.....*C. chrysarginus*, St. Farg.

♀. Larger than preceding; body very black; femora broadly tipped with yellow.....*C. villosifrons*, Packard.

♂. Femora one-half black and yellow; abdominal fasciæ very broad; three terminal bands.....*C. Packardii*, Cresson.

♂. Five broad abdominal bands; one basal pair of triangular sinuate fasciæ. ♀. Tip of the abdomen very broad and flat; body slender.....*C. dilectus*, Cresson.

**D.** ♂. Head triangular. ♀. Head quadrangular in front, not narrowing as usual towards the insertion of the mandibles; basal abdominal ring immaculate.

♀. Very large size; fore femora streaked above with rufous.....*C. quadrangularis*, Pack.

♂. Abdomen 10-spotted; head deeply channelled in front. ♀. Two anterior femora tipped with yellow.....*C. singularis*, Smith.

♂. Head deeply channelled in front; middle femora broadly rufous; abdomen 14-spotted.....*C. 14-maculatus*, Pack.

♀. Femora entirely black, body longer and slenderer than usual; scutellum black; tip short.....*C. oblongus*, Packard.

♂. Middle femora rufous.....*C. trapezoides*, Packard.

**E.** Abdomen subpedunculate, basal ring being longer and slenderer than usual.

a. *No fasciæ on the third abdominal ring.*

♂. Body black; abdomen 4-spotted.....*C. paucimaculatus*, Pack.

♂. Head very cubical; basal joint of abdomen subfiliform; front of head golden.....*C. auriceps*, Cresson.

♂. Abdomen 6-spotted, with a terminal linear band; fore femora rufous. ♀. Body stout; fore femora black; abdomen 6-spotted.....*C. 6-maculatus*, Say.

b. *A lateral spot on third abdominal ring.*

♂ ♀. Fore femora tipped with yellow.....*C. trifasciatus*, Say.

- F.* Head transversely cubical; species long and slender; abdomen 8-spotted, with a terminal band in ♂.
- ♂. Fore femora rufous. ♀. Tip of abdomen broad triangular.....*C. pauper*, Packard.
- ♂. Antennæ strongly bidentate; anterior and middle femora tipped with yellow; tarsi yellow.....*C. denticulatus*, Packard.
- ♀. Enclosure of propodeum with seven large fossæ; tarsi brown.....*C. tenuiglossa*, Packard.
- G.* ♀. Head broad and short; body stout, elongated, abdomen longer than head and thorax together; tip of abdomen pinched, deeply channelled, abdominal fasciæ acute above, narrow.
- ♀. Basal abdominal ring spotted; middle femora only tipped with yellow.....*C. obscurus*, Smith.
- ♂. Like *C. obscurus*, but clypeus silvery.....*C. montanus*, Cresson.
- ♀. Terminal abdominal fasciæ orbicular, united; fore and middle femora slightly tipped with yellow.....*C. contiguus*, Cresson.
- H.* Head subcubical; species of small size.
- a. ♂. Two terminal abdominal bands.
- ♂. Prothorax yellow, crested; baso-abdominal bands present.....*C. cristatus*, Pack.
- ♂. Basal joint of the abdomen immaculate; femora brown; head cubical; antennæ scarcely denticulated; propodeum finely striated.....*C. brunneipes*, Pack.
- ♂. Propodeum with no mesial furrow, with very coarse fossæ. Head very narrow.....*C. effusus*, Pack.
- b. Five pairs of short, ovate abdominal fasciæ.
- ♀. Terminal pair round; scape yellow.....*C. cubiceps*, Pack.
- ♀. Enclosure of propodeum very coarsely corrugated; tip of abdomen unusually compressed and narrow.....*C. corrugatus*, Pack.
- ♀. Terminal round abdominal spots unusually distant; thorax and femora black.....*C. parvulus*, Pack.
- I.* Antennæ simple slender; head short and broad, abdomen longer than head and thorax together, with two or three terminal continuous bands.
- ♂. Fore femora black, clypeus yellow. ♀. Clypeus long, mandibles yellow, tip pinched.....*C. septentrionalis*, Pack.
- J.* Head very cubical; abdomen much shorter than the rest of the body, which is rather coarsely punctured; first segment coarctate; second ring usually with broad fasciæ either separate or united.
- ♂ ♀. No fasciæ on third abdominal segment, meso-scutellum and meta-scutellum striped; species of under size.....*C. stirpicola*, Pack.
- ♀. Short and broad stripe on third abdominal ring: meso-scutellum entirely yellow, front of head golden.....*C. cressus*, St. Farg.

- ♀. A dorsal and lateral linear stripe on third abdominal ring; scutellum black. Clypeus golden, sides silvery; body roughened.....*C. scaber*, St. Farg.

Group A.

The body is shorter and more compact, the head is more cubical than in *C. 6-maculatus*, or *C. septentrionalis*, the front is not excavated so much as usual in *Crabro*; eyes narrower than usual, the head narrows towards the clypeal region more than usual, hence the clypeal region is narrower, the antennæ are shorter and more clavate. The wing characters do not present any differences of value. Prothorax angulated on the sides, and the body is more coarsely punctured than in any of the succeeding species.

*C. interruptus*, St. Fargeau.

*Solenius interruptus*, St. Farg., et Brullé. Ann. Soc. Ent. France, iii. p. 716. (1834.)

St. Farg. N. H. Hym. iii. p. 122. (1845.)

*Crabro confluentus*, Say, Bost. Jour. Nat. Hist. i. p. 376. (1837.)

♂. *Crabro dubius*, Smith, Cat. Hym. Br. Mus. iv. p. 417. (1856.)

*Crabro confluentus*, Smith, Cat. Hym. Br. Mus. iv. p. 420. (1856.)

♂. Head subcubical, two-thirds as long as broad, narrowing a little behind, surface convex; ocelli in an equilateral triangle, not channelled in front, except at the antennal groove, which is deep and lined on the sides with a silvery pubescence; clypeus nearly as long as broad, covered with a silvery pubescence, clypeal region very narrow. Mandibles black, stained with ferruginous in the middle. Antennæ short, thickened especially towards end; scape long clavate yellow, with a dark stain on the upper side; basal joint of flagellum yellow, stained with ferruginous above, second to fourth joints brown, becoming brown-black towards tip. Surface of body covered with unusually large and deep punctures.

Prothorax long, angulated in front, edge emarginate, raised; lateral tubercle conspicuous, yellow, pupilled with black, meso-scutum broad, with a short raised line on the anterior margin; no submesial or parapsidal grooves present; scutellum with two yellow spots, often entirely black; postscutellum with a transversure line. Enclosure of propodeum obsolete, entire segment very coarsely and irregularly punctured, being larger than on anterior rings. Tegulæ testaceous, basal wing pieces black, wings clear, hardly smoky, nervures bright ferruginous. Femora yellow at tip, especially beneath, and most broadly tipped with yellow in fore legs; tibiæ yellow, touched with brown within especially on hind tibiæ; tarsi yellow, tinged with ferruginous towards ungues.

Abdomen coarsely punctured, wings unusually convex in the middle, edges emarginate, four pairs of sinuate fasciæ on the four basal rings, and two continuous bands on each succeeding ring; two basal fasciæ most sinuate and slender, those on the fourth ring are more approximate than those on the two preceeding rings; the broad large band on the fifth ring is sometimes separated into two fasciæ; terminal linear band sometimes absent. Beneath black, and a little testaceous on the hind edge of terminal rings.

Length of body, .34; head and thorax, .17; abdomen .17 inch.

♀. Differs in having the head more cubical, not narrowing behind, the surface above is broad and slightly convex; ocelli in a curved line, or very low triangle; eyes smaller and front more contracted than usual; orbits lined with a silvery pubescence as on clypeal region; clypeus a little shorter than broad, carinated mesially; antennæ short and clavate; coloration as in ♂, except that the five fasciæ are ovate and removed a considerable distance from the mesial line; enclosure of prothorax well marked, sublunate.

Length of body, .42; head and thorax together, .22; abdomen .20 inch.

Mass., Canada, Ill., N. J. (Coll. Ent. Soc. Phil.) Mass., (Coll. Harris, Sanborn and Shurtleff.) Conn., (Norton.) Dublin, N. H., Leonard, (Harris Coll.) Va., Ridings, (Coll. Ent. Soc. Phil.)

This species is of moderate size and readily distinguished by its coarsely punctured body, by the convexity of the middle portion of the abdominal rings, by the black femora tipped with yellow. Sometimes the prothorax is entirely black.

St. Fargeau undoubtedly had the female of this commonly diffused species in view when he described his *Solenius interruptus* in 1834, in this description he anticipated Say whose description was published in 1837.

Should *Thyreopus* be considered as but a section of *Crabro*, then the name *Thyreopus interruptus* of St. Fargeau, Ann. Soc. Ent France, iii. 755, 2 ♂, will have to be dropped for some other name, as in the same article, page 716, he describes the present species under the name of *Solenius interruptus*.

A specimen from Brunswick, Me., has a smooth body, especially the abdomen, the basal pair of fasciæ nearly obsolete, the other fasciæ broader and separated farther apart than usual.

A ♂ specimen from Western Virginia, collected by Mr. Ridings, has the mandibles entirely black, the upper side of the scape and an-



tennæ stained with a long ovate brown spot extending beyond the middle of its length; the meso-scutellum has two yellow, geminate spots, and the fifth and sixth abdominal fasciæ are united to form a continuous band. A ♀ specimen from the same locality has a broad yellow band on the meso-scutellum, more than twice as broad as on the meta-scutellum, while another variety for which we are indebted to the same zealous collector, has the scutellum entirely black, and only a linear yellow stripe on the postscutellum.

This peculiar species is interesting as affording a passage from *Crabro* to *Ceratocolus* by its narrow, long head, narrow triangular front, peculiar clavate antennæ with the terminal joint spherico-conical, its narrow ovate abdomen, shorter than the rest of the body which is coarsely punctured. It approaches *Ceratocolus producticollis* in its head narrowing behind, and the simple untoothed antennæ and the form of the abdomen, though the prothorax is much wider, shorter, and the abdomen is much larger.

It also affords a passage into *Cerceris* by the raised clypeus and exposed labrum concealed partially beneath, which can be more plainly seen in this species than the typical ones of the genus; also by its convex abdominal rings, high colors, punctured body and narrow elongated form it connects *Crabro* with *Cerceris*.

From *Crabro rufifemur* it will readily be distinguished by its much smaller size, still narrower body, and longer head which narrows rapidly behind; also, by the broad yellow fasciæ closely contiguous or united, which are lanceolate ovate and hardly sinuate, those on the second and third segments not at all so; and by the fore femora being half black and yellow, but not ferruginous.

*Ceratocolus-like species.*

♂. Head twice as broad as long, being transversely oblong; clypeus as long as broad, being unusually elongated; antennæ with a very clavate scape, unusually flattened flagellum, terminal joint being minute, but acutely conical; thorax much elongated, especially anteriorly; abdomen subglobular, being unusually short in proportion to the rest of the body, shorter than the thorax, whole body very coarsely punctured, and the rings of the thorax are more separate and convex than in *Crabro* proper.

*Crabro producticollis*, n. sp.

♂. Head transversely oblong, cuboidal, not narrowing behind more than usual, surface coarsely punctured, vertex slightly convex; front longer than usual, the head being unusually narrow, and the clypeus

black, greatly elongated, nearly as long as broad and ridged along the median line, edge rounded convex, antennal groove very deep, suddenly sunken below the surface of the triangular front; orbits densely silvery pubescent, antennæ broad and flattened, scape clavate, rapidly increasing in width towards the end; joints of flagellum broad and flattened beneath, above convex, shorter than broad; terminal joint acutely conical, very much smaller than usual, brown, scape yellowish towards the base.

Thorax elongated ovate, wings appearing as if set far back owing to the prolongation of the meso-thorax, and the elongated prothorax, which anteriorly is developed more than usual. Propodeum elongated, the enclosure obsolete, median furrow narrow, on each side a net work of small fossulets, the rugæ enclosing them being straighter longitudinally than the transverse ones; entirely black except the yellow tubercle. Fore femora yellow, with a black line at base; trochanters broadly dilated towards the tip; femora twice dilated, so that the outer edge is sinuate, near the base a small spine; tibiæ widened perceptibly towards the tip, but with no emarginate expansion; middle and hind femora black, tibiæ with a blackish stripe within; tarsi yellow, fuscous at tips.

Abdomen very short, round, ovate, surface finely punctured, but smooth and shining, basal joint broad, with five pairs of long oblong fasciæ, not obliquely arranged on the rings, but straight, and a little farther apart than usual.

Length of body, .47; head and thorax, .36; abdomen, .11 inch.

New Jersey, (Coll. Ent. Soc. Phil.).

This very aberrant species connects this genus with *Ceratocolus vexillatus* of Europe, by its very long thorax, and shortened abdomen; and rather than place it in *Ceratocolus*, I prefer to consider it as a *Crabro*, but forming a distinct section of the genus as indicated above, as it does not differ essentially in the neuration of the wings, nor in the form of the head as seen from above. It differs in the elongated front, and the structure of the fore femora, and is much smaller than usual; and in this respect, and in the want of any yellow markings on the thorax, except the tubercle, and its coarsely punctured body, will be easily recognized.

***Crabro bellus*, Cresson.**

*C. bellus*, Cresson, Proc. iv. p. 481. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***Crabro atrifrons*, Cresson.**

*C. atrifrons*, Cresson, Proc. iv. p. 483. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***Crabro atriceps*, Cresson.***C. atriceps*, Cresson, Proc. iv. p. 483. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***Crabro odyneroideis*, Cresson.***C. odyneroideis*, Cresson, Proc. iv. p. 481. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***Crabro honestus*, Cresson.***C. honestus*, Cresson, Proc. iv. p. 485. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***C. nigrifrons*, Cresson.***C. nigrifrons*, Cresson, Proc. iv. p. 482. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***Crabro gracilissimus*, n. sp.**

♂. Head broad, transverse, rather short, a little more than one-half as long as broad, narrowing but slightly behind; surface broad, slightly convex, ocelli arranged in a low triangle, front but slightly channelled. Antennal groove well marked, on each side a thin, sparse silvery pubescence. Sides of head converge rapidly towards the clypeal region which is narrow and long; clypeus long as broad, being a little longer than usual, sharply carinated; mandibles black, antennæ short and stout, scape yellow, black above; second joint of flagellum with two unusually large teeth beneath, third, fourth and fifth also dentate, black.

Prothorax with two short, high carinations which are yellow. Body as well as the head finely though not minutely punctured, thorax otherwise black, except the yellow tubercles. Meso-scutum punctostriated, especially posteriorly, as are the scutellum and especially the meta-scutellum. Enclosure of the propodeum long, narrow sublunate, with longitudinal, irregular coarse rugæ, a few transverse coarse rugæ, with interrupted longitudinal rugæ, making the sides appear angular; its surface covered with subquadrate fossæ. Tegulæ dark ferruginous, wings clear not clouded; nervures ferruginous; femora black, fore femora yellow towards tip beneath; tibiæ slender, yellow, black within, posterior ones black externally at tip; fore and middle tarsi yellow, black towards the unguis; hind tarsi entirely brown.

Abdomen long and slender, equalling the thorax in length, no band on the basal ring; on second, two large fasciæ, nearly meeting, two succeeding pairs much smaller and farther apart; on fifth and sixth a continuous band; tip broad sub-spatulate, slightly hirsute. Beneath a little paler on the edge of the wings and with a few sparse hairs.

Length of body, .30, head and thorax, 15; abdomen, .15 inch.

Colorado Territory, Ridings, (Coll. Ent. Soc. Phil.)

This is a very slender species, the most so of any observed in this section of the genus. The large stout teeth of unusual proportions, the long narrow clypeus, the finely crested prothorax and black mesonotum, and black body generally, the black femora, the coarsely sculptured propodeum and the long, slender produced abdomen, together with the great differences in coloration between the two anterior and posterior pairs of tarsi will distinguish this from all the other species of this section of the genus.

### Group B.

**Crabro 10-maculatus**, Say.

*C. 10-maculatus*, Say, West. Quart. Rep. ii. p. 78. (1823.)

Harris, Cat. Ins. Mass. p. 68. (1835.)

♀. Head a little more cubical, being a little longer than in *C. arcuatus*. Eyes larger, sculpturing the same. Front not hairy; antennal groove nearly covered in by the golden pubescence extending from the orbits, which is of a deeper hue on the clypeus, but on the lateral lobes is silvery; clypeus and the lateral pieces as described in *C. arcuatus*; mandibles yellow, black at tip, tridentate, two outer teeth nearly equal in size, inner the more minute of the two, and on the basal half a stout triangular tooth. Antennæ long, slender, clavate; scape long, slightly dilated within, entirely yellow, basal joint and base of second joint of the flagellum yellow; remaining joints black; sutures distinct as usual, but tip not dilated as usual.

Prothorax strongly banded with yellow, the two bands more contiguous than usual; on the flanks two yellow spots, one the tubercle, the other a square oblique yellow spot behind it; scutellum and meta-scutellum yellow, the scutellum appendiculated by two lateral yellow spots lying contiguous to it. Thorax more coarsely punctured than in *C. arcuatus*. Enclosure of the propodeum coarsely punctured, but with hardly any radiating lines; on the scutum are a few coarse, transverse rugæ, with coarse punctures between them. Wings as in *C. arcuatus*, anterior legs yellow, femora black on the upper side, and tips of tarsal joints slightly ferruginous; middle and hind femora colored much alike, black at base, shading into ferruginous, and then becoming yellow at tip; tibiæ entirely yellow, tarsi yellow, tips of terminal joints becoming ferruginous. Abdomen with ten yellow fasciæ, basal pair sinuate, of the same distance apart above as in *C. arcuatus*; last pair most continuous; tip mucronate, narrower than in *C. arcuatus*; a smooth space above on the preceding ring.

Length of body, .56; head and thorax, .30; abdomen, .26 inch.

Mass., (Coll. Harris); West Farms, N. Y., (Norton, Angus); Delaware, (Coll. Ent. Soc. Phil.)

This species is thicker and stouter, with heavier bands, more coarsely punctured and less striated than in *C. arcuatus*, and the two terminal bands of the abdomen become separated; the golden pubescence ascends much nearer the ocelli than in that species. It will also be distinguished by the antennæ being yellow on the three basal joints, the legs being nearly entirely yellow and the head more cubical.

One specimen from New York has a distinct large ferruginous patch on the base of the abdomen.

Dr. Harris captured this species on the sands near Mt. Auburn, Cambridge. He also found, July 27, 1836, a nest of this species made in a rotten stump, which was "abundantly provisioned with *Tabanus lineola* Fabr. and *T. divisus* Harris." MSS.

***Crabro aurifrons*, Smith.**

*C. aurifrons*, Smith, Cat. Hym. Br. Mus. iv. p. 420. (1856.)

♀. Head large cubical, vertex broadly convex, ocelli placed in a low triangle, antennal groove shallow. Orbits and clypeus covered with a silvery golden pubescence, which extends from the orbits into the middle of the groove, clypeus large, prominent, well carinated, longer than in *C. 10-maculatus*. Mandibles stout, equally bidentate, rufous-yellow, terminal third black. Antennæ stout, filiform, not thickening towards the tips, scape entirely yellow, including first and basal half of the second joint of flagellum, remainder black, sutures well defined.

Prothorax narrow, smooth and rounded on the sides, slightly carinated on each side of the mesial notch, yellow. Body minutely punctured, with a minute gray pubescence, meso-scutum thickly punctured, not striated; a rufous yellow stripe on front edge of scutellum; meta-scutellum concolorous. Propodeum uniformly finely striated, enclosure lunate, nearly obsolete, mesial furrow narrow, tubercle yellow; three rufous indistinct stains on flanks below the insertion of the secondaries. Tegulæ testaceous, wings slightly clouded, nervures rufous. Coxæ tipped with rufous, femora all rufous. Legs stout, hirsute, tibiæ and tarsi entirely yellow, apical joints of hind tarsi tipped with rufous. Two basal joints of abdomen rufous broadly edged with black, with five pairs of sinuate fasciæ, tips mucronate, very compressed, deeply channelled with a dense stiff yellow hirsuties. The fasciæ are more remote above than in *C. 10-maculatus*.

Length of body, .64; head and thorax together, .34; abdomen .30 inch.

Florida, (Norton); "Georgia," (Smith).

From *C. 10-maculatus*, to which the present species is nearest allied, it differs in being larger, in its longer clypeus, narrower prothorax, in wanting the oblong spot behind the tubercle, in having almost entirely rufous femora, where in *C. 10-maculatus* they are more than half black and broadly tipped with yellow; in having small less contiguous abdominal fasciæ and in the basal joint being broadly rufous. My specimen is evidently immature, as the fasciæ of abdomen are very obscure, and Smith does not notice the rufous tinge pervading the yellow fasciæ.

***Grabro cubensis*, Cresson.**

*C. cubensis*, Cresson, Proc. iv. p. 152. (1865.)

Cuba, (Coll. Ent. Soc. Phil.)

Group *C.*

***Grabro rufifemur*, n. sp.**

♂. Head cubical, a little more than twice as long as broad, but slightly narrowing behind, above very convex, ocelli arranged in a low but nearly equilateral triangle, slightly hirsute on each side in front of the ocelli, graduating into the silvery pile broadly lining the orbits; sides of head converge sensibly towards the clypeal region which is covered with a silvery pubescence. That on the clypeus itself is dull yellowish; clypeus itself two-thirds as long as broad, obscurely carinated. Mandibles yellow, becoming ferruginous and then black at tips. Antennæ short and thick, scape much thickened just before the middle, entirely yellow, fifth joint of the flagellum much pinched in beneath, giving a bidentate appearance, basal and third joints of antennæ ferruginous, remaining joints blackish.

Head and body narrow, coarsely punctured, black. Prothorax on each side transversely carinated, acutely angled on the sides, yellow above. Surface of thorax behind very convex; on mesoscutellum no lines or submesial ridges, or parapsidal grooves present; scutellum large, black, a yellow spot on the smooth postscutellum. Propodeum with the enclosure not very distinct, punctostriated obliquely, with a well marked mesial furrow, especially wide and deep posteriorly. Tegulæ testaceous; wing pieces yellow, ferruginous and black; nervules blackish, more ferruginous at base, wings a little clouded. Below the insertion of the wings the flanks are covered with a thin silvery pile; yellow tubercle very distinct. Femora above slightly yellow, honey yellow towards tips, beneath black; tibiæ yellow, ferruginous within; tarsal joints yellow, slightly ferruginous at tip; unguital joint brown-black.

Abdomen high narrow, very convex above, flattened beneath; each ring convex mesially, edges slightly emarginate, shorter than head and

thorax together; on two basal segments a pair of fasciæ, broadly ovate on second ring, those on first ring very sinuate; fasciæ on third ring either separate or united; continuous narrow bands on three succeeding rings, smooth on the hinder edge; terminal one deeply excavated behind, and sometimes nearly obsolete; tip short and subpunctate; beneath, the hinder edge of all the rings are pale brown, almost testaceous.

Length of body, .36; head and thorax together, .20; abdomen, .16 inch.

♀. Head unusually broad, narrowing behind unusually, being a little more than one-half as long as broad. Eyes remote, ocelli situated in a low triangle; surface of vertex very convex, slightly channelled in front of the middle ocellus; antennal groove well marked; on each side broadly lined with a silvery pubescence, in some lights reflecting a slightly golden hue; clypeal region silvery, on clypeus itself slightly yellowish; joints of antennæ entire, otherwise as described in male. Prothorax carinated; two geminate yellow spots on mesoscutellum and a lateral dot on each side towards the insertion of the wings. Enclosure of propodeum quite smooth, with radiating fine lines marking off the limits of the area. Abdomen fasciated on each ring, those on the third, fourth and fifth rings forming continuous bands.

Illinois, (Coll. Ent. Soc. Phil.).

***Crabro chrysarginus*, St. Farg.**

*C. chrysarginus*, St. Farg. Ann. Soc. Ent. France, iii. p. 711. (1834.)

*C. arcuatus*, Say. Bost. Jour. Nat. Hist. i. p. 377. (1837.)

♀. *C. chrysarginus*, St. Farg. H. N. Hym. iii. p. 114. (1845.)

*C. chrysarginus*, Dahlb. Hym. Eur. i. p. 386, 257. (1845.)

*C. chrysarginus*, Smith, Cat. Hym. Br. Mus. iv. p. 420: (1856.)

♂. Vertex, broad, convex; eyes, smaller than usual, do not reach to middle of vertex; ocelli arranged in a low triangle or curved line; surface finely punctured; just in front of the ocelli sparsely hairy; orbits very broadly lined with a silvery pile nearly meeting in the middle of the antennal groove; clypeal region silvery. Mandibles yellow, tips either black or piceous, antennæ unusually long and slender, scape yellow, a little swollen within, where is a dark brown stripe; basal joint of flagellum very long, yellowish at tip, second joint very long, being nearly two-thirds as long as the scape, at its base suddenly contracted as if pinched, being concave beneath; remaining joints nodose toward tips, fifth with a large tooth beneath.

Thorax finely punctured, a silvery pile on the flanks thicker than usual; on prothorax are interrupted yellow stripes; tubercle yellow, te-

gulæ and nervures paler than usual, testaceous, either a stripe or two remote yellow spots just in front of meso-scutum on the lateral prolongation (these spots are in another specimen absent); a yellow stripe on the scutellum; metathorax coarsely puncto-lineated, enclosure distinctly sublunate; the mesial furrow indistinct, as large, high closely set rugæ diverge in curved lines, becoming transverse and more numerous and finer posteriorly, where the thorax is more hairy than usual. Anterior femora yellow, with an obtuse spine at base, black at base above; tibiæ and tarsi yellow, terminal joints glaucous; middle and hind femora black, yellow above towards tip, with a black stripe within, which is longer on the middle joint; tarsi yellow, towards ungues glaucous ferruginous.

Abdomen with convex joints, distinct sutures, finely punctured, with three pairs of transverse sinuate fasciæ on the three basal joints, on 4th-6th rings, a narrow continuous band, situated on the hinder edge of each ring; basal fasciæ rounded within, suddenly narrowing on the sides; tips broadly spatulate, acute. Beneath, the joints of the abdomen are ferruginous at the edge.

♀. Differs in having the front more golden, especially the clypeus; Antennæ long clavate, sutures becoming more distinct towards the tips, second and third joints next to terminal one of flagellum being dentate, a long yellow spot behind the yellow tubercle, base of propodeum coarsely striated, most of its surface is finely striated and comparatively smooth, and the enclosure is posteriorly finely striated; second sub-median recurrent is more transverse than in the ♂. Legs darker; fore and middle femora black, reddish yellow at tips; inside of tibiæ, yellow; hind pair entirely black, tibiæ streaked with dark brown within. Abdomen as in ♂, tips broad triangular, slightly channelled, convex at base; tips hirsute.

Length of body, ♂, .44—.48, ♀ .56; head and thorax together, ♂, .26, ♀, .30; abdomen, ♂, .22, ♀, .26 inch.

Maine, (Packard); Mass., (Sanborn, Coll. Harris); Canada, (Coll. Phil. Ent. Soc.); "Indiana; Hudson's Bay," (Smith).

This species will be easily recognized by the ♂ subtrapezoidal head, the ♀ denticulate antennæ, the golden clypeus of ♀ as distinguished from the silvery sides of clypeal region, the geminate yellow spots on the flanks, the ten fasciæ of ♂, which on the last three rings become continuous yellow bands. The ♀ is broader and stouter than in the other species of this section.

Say's *C. arcuatus* must be united with St. Fargeau's *C. chrysarginus*.



Say in his description does not mention the sex of the specimens before him, but they must have been ♀. St. Fargeau's descriptions only differ in "*Pedeo lutes-rufi coxarum basi tarsorumque apice fuscis.*" A specimen received from Mr. Norton, labelled *C. chrysarginus*, agrees with this description, but otherwise with *C. arcuatus*, and I therefore unite them, as I have a specimen from Massachusetts, partly fuscous at the tips of the middle femora.

*Crabro villosifrons*, n. sp.

♀. Head of the usual proportions; two-thirds as long as broad; surface very finely punctured; a little convex as usual; orbits broadly lined with a silvery pubescence, golden when seen in some lights, giving an unusually velvety pilose appearance to the front; clypeus long, sub-acutely produced in front, well carinated and distinctly marked from the lateral lobes, which are large and well developed, silvery; mandibles yellow, tip black piceous. Antennæ of moderate length, thickening a little towards the tips; scape very slightly dilated within, entirely yellow; flagellum closely jointed, piceous. Thorax short and thick, robust. Prothorax with a slightly interrupted yellow band; surface of meso-thorax finely punctured, as in the head; two submesial furrows present on the scutum, two yellow spots on the flanks, of which the posterior is oblong; parapsidal groove obscurely marked; a slight line on the scutellum. Propodeum with a broad, well-marked sublunate enclosure, with a narrow, obscure mesial furrow; on each side are diverging fine lines posteriorly becoming fine and transverse. Wings dark, clouded, tegulæ much paler than the nervures, which are ferruginous. The femora black, yellow at tips; tibiæ yellow, anterior pair yellow with a black line behind; tarsi yellow, terminal joint blackish, middle and hind femora black, outer third, especially above, yellow; tibiæ and tarsi yellow; terminal joint becoming ferruginous towards the black ungues. Abdomen long narrow, ovate, on the basal joints three pairs of fasciæ, of which the basal are subreniform, third pair linear, more remote than first pair; hind margin of fourth and fifth rings banded with yellow continuously; tips triangular mucronate, broad, lateral ridge obsolete towards base, hirsute; beneath black.

Length of body, .54; head and thorax, .30; abdomen, .25 inch.

N. J., Penn., (Coll. Ent. Soc. Phil.).

The long cubical head, broad front, clypeus golden in distinction from the silvery lateral lobes, the finely striated propodeum, and minutely punctured velvety head, and the remote fasciæ at the base of the abdo-

men will distinguish it sufficiently from *C. dilectus*, aside from its much larger size.

Another specimen from Pennsylvania, has the basal fasciæ very contiguous, and on the end of each band is deeply excavated.

**Crabro Packardii**, Cresson.

*C. Packardii*, Cress., Proc. iv. p. 477. (1865.)

Col. Terr., (Coll. Ent. Soc. Phil.).

**Crabro dilectus**, Cresson.

*C. dilectus*, Cress., Proc. iv. p. 478. (1865.)

Col. Terr., (Coll. Ent. Soc. Phil.).

#### Group D.

**Crabro quadrangularis**, n. sp.

♀. Head of the same proportions as in *C. singularis*, very finely punctured, smooth and shining; antennal groove broad and deep; orbits silvery; clypeal region as in *C. singularis*; scape yellow, flagellum black, not quite so slender as in *C. singularis*. Two square, yellow, remote spots on its prothorax; meso-scutum more coarsely striated than in *C. singularis*; a yellow stripe in scutellum and post-scutellum. Enclosure of propodeum with the mesial groove but little larger than the lateral grooves which are crossed by the diverging ridges; posteriorly on the flanks a net-work of coarse rugæ. Wings as in *C. singularis*. Fore femora black, ferruginous at tip above; tibiæ yellow, with a ferruginous line within; tarsi yellow, ferruginous towards the ungues. Middle and hind femora black, a yellow dot above at the tips of middle femora; tibiæ yellow, within black-brown; first joint of tarsi yellow, black at tip, terminal joints black.

Abdomen much larger and narrower in proportion than *C. singularis*, not so convex beneath; with eight remote straight not sinuate fasciæ, none on the last ring. The fasciæ do not decrease in length and size from the tips, and they differ from those on *C. singularis* in being more obtuse above; the tip is much more produced, the lateral ridges bordering the triangular surface become obsolete towards the base, and on the succeeding ring is a smooth, triangular area, only noticed in this section of the genus.

Length of body, .66; head and thorax, .32; abdomen, .84 inch.

Penn., (Coll. Ent. Soc. Phil.).

This is not only longer and larger, with the abdomen narrower in proportion than in *C. singularis*, but is more finely punctured and striated, and blacker, with no spots or lines on the meso-thorax, while the abdomen is eight-spotted, with the fasciæ even in size, and ovate lanceolate, not narrow wedge-shaped. Both will be easily distinguished

by the remarkably square head and front, which does not as usual round inwards towards the insertion of the mandibles. It is less hirsute than *U. singularis*.

**Crabro singularis, Smith.**

*C. singularis*, Smith, Cat. Hym. Br. Mus. iv. p. 417. ♂. (1856.)

♂. Head black, finely punctostriated, with a slight pubescence in front and on the sides, a line of silvery pubescence on the orbits, as in the clypeal region. Antennæ long and slender, scape long, slightly angulated, sub-clavate, yellow, with or without an ovate dark spot on the inside; flagellum black; joints very long, especially the second, which is fully one-half as long as the scape; third joint arcuated, dentate beneath, terminal joint long obconic.

Thorax black, finely punctured, meso-scutum finely striated, flanks pilose, concealing the sculpturing on the propodeum, especially dense on the anterior flank. On each half of the prothorax is a yellowish irregular yellow spot; tubercle yellow; meso-scutum black, bipunctate with yellow. Trochanters black, femora pale yellow, dilated and flattened with a stout spine at base externally, and provided with a thin brush of fine hairs; tibiæ pale, straw yellow; tarsi concolorous, terminal joint and unguis black. Middle pair of legs entirely black, except the basal joint of the tarsus which is straw yellow, and there are two minute parallel yellow streaks on the outer side of the tibiæ. Hind trochanters and femora black; tibiæ yellow, black at tip; basal joint of the tarsus yellow, black at tip, remaining joints black.

Abdomen shiny black, with ten or twelve lateral fasciæ, of which the first pair are much the largest, approaching one-half nearer the median line of the body than the succeeding pair, which are one-half as large and elliptical in form; the last pair small, linear; all are oblique, and placed on the front margin of each ring, tips black, terminated by a few hairs. Beneath black as usual.

Length of body, .50; head and thorax, .26; abdomen, .24 inch.

♀. Head very square in front and unusually large. Body very black, shiny, very finely puncto-striated, and free from pubescence, except on the flanks of the thorax. Head very finely punctulated, not striated; no pubescence in front; eyes as usual, finely lined with a silvery pubescence; clypeus black, covered with a golden pile, while on each side it is silvery; mandibles yellow, black at base and tip. Antennæ with the scape entirely yellow, remaining joints black. Thorax finely striated, a large, disconnected, yellow stripe on the prothorax; tubercle yellow; on meso-scutellum a geminate spot, some-

times united on the median line, and forming a broad, bilobate stripe, No distinct enclosure on the propodeum; a mesial longitudinal furrow. flanked at its extremity by two large and well-marked orbicular pits just in front of the insertion of the abdomen; above, the surface is lineated by regular lines or rugæ, slightly diverging outwards and downwards; no cross rugæ; the lines are not continuous, but those beginning at the base of the propodeum terminate unequally, and in their interspaces new lines begin. Tibiæ yellow, often striped with fuscous externally, and with an inner black stripe, testaceous at tip; tarsi yellow, terminal joints dark fuscous. Middle legs colored like the anterior pair, tips of the tibiæ are blacker. Hind trochanters and femora black, tibiæ yellow, tipped with black. Abdomen as in ♂, 8-10 spotted, sometimes actually pointed inwards.

Length of body, .54-.64; head and thorax, .32; abdomen, .32 inch.

White Mts., N. H. on Solidago; Brunswick, Me. (Packard,) Mass. (Sanborn and Shurtleff); Conn., (Norton); Canada and Penn., (Coll. Ent. Soc. Phil.). "Trenton Falls, Doubleday," (Smith.)

The ♀ differs from the male, not only structurally as above noticed, but in having eight or ten yellow spots or fasciæ, in being smooth, scarcely punctured, in the clypeus being golden, and the fore femora simple.

***Crabro 14-maculatus*, n. sp.**

♂. Head subtriangular, nearly as long as broad; vertex convex, elevated, slightly concave next the eyes; front much elevated, more than in *C. singularis*; surface striated, hardly punctured, with a few silvery hairs on the orbits; clypeus black, longer than in *C. singularis*; with a thin, silvery pile. Mandibles yellow, piceous at tip; antennæ structurally as described in *C. singularis*, but the scape is stouter, more clavate, yellow, with an ovate black spot within; third joint of flagellum pointed in at base, other joints slightly swelled, piceous black. Thorax coarsely puncto-striated black, with two short yellow fasciæ on the prothorax; usual yellow tubercle on the flanks, ocellated with a black dot; scutellum and meta-scutellum black. Propodeum with the median furrow well marked, with a coarse, irregular net-work of rugæ. Patagia and nervures testaceous, wings with the slight violaceous hue as in *C. singularis*. Fore femora yellow and dilated as in *C. singularis*; middle femora ferruginous above, below black; tibiæ yellow, on the basal half above, remainder of joint mixed with streaks of ferruginous and yellow; basal joint of tarsi yellow, tip black as are

the remaining joints; hind femora entirely black; tibiæ yellow, black at tip, tarsal joint yellow, black at tip, as are the remaining joints.

Abdomen fourteen-spotted, very black, on basal ring a pair of minute yellow dots; fasciæ on the second ring much larger than the others posterior to them, very approximate; posterior fasciæ more remote, especially those on the terminal ring; tip elongate spatulate.

Length of body, .46; head and thorax, .22; abdomen, .24 inch.

Illinois, (Coll. Ent. Soc. Phil.).

This rare species is very black, less hirsute than usual, and with an unusual number of fasciæ or spots on the abdomen, as the basal and terminal segments are both spotted, the last being of rare occurrence in the genus. Compared with *C. singularis*, the head is more deeply excavated on the vertex, and in front still more so; the orbits are less pubescent than usual, the abdomen is longer, the legs ferruginous and black.

***Crabro oblongus*, n. sp.**

♀. Closely allied to *C. singularis*, head of much the same proportions, but narrows a little behind, and is throughout narrower as the entire body is. Eyes a little nearer together; the convexity of the vertex and the grooving of the front the same as in *C. singularis*. Antennal groove well marked, polished, on each side a narrow edging of silken pubescence; clypeus golden as in *C. singularis*, but the hairs are much finer, the lateral lobes are more triangular and silvery; mandibles black, with the middle wedge-shaped area twice grooved towards the base, where in *C. singularis* it is smooth; palpi slender, joints much longer and slenderer by one-third than in the other species above-named. Antennæ as in *C. singularis*, scape entirely yellow, hardly as stout, joints of flagellum a little stouter. Two square, yellow spots on the prothorax; lateral tubercle yellow; meso-thorax entirely black above with no yellow markings; surface of the scutum finely striated; scutellum and meta-scutellum highly polished. Propodeum much as in *C. singularis*, but the mesial furrow widens at base, with similar lateral and transverse rugæ; legs colored much the same; within the hind tibiæ a dark stripe. Abdomen long, sides unusually parallel, giving it an oblong slope; with ten yellow fasciæ, those in the basal joint being simply dots, those in the second ring much larger than the succeeding ones, not wedge-shaped, but elliptical; beneath very convex; tip one-half as long as in *C. singularis*, the enclosed triangular upper surface much longer and narrower than in the allied species.

Length of body, .64; head and thorax, .33; abdomen, .31 inch. Conn., (Norton).

Differs from *C. singularis* in its much narrower and slenderer body, narrower head, larger palpi, with mandibles grooved towards insertion in the middle area; in the wholly black meso-thorax, except the yellow tubercle, and in the abdomen having an additional pair of fasciæ. The tip of the abdomen is scarcely one-half as large, of different proportions, being longer and narrower than in *C. singularis*, while the abdomen is much flattened above, where in *C. singularis* it is much more convex.

*Crabro trapezoides*, n. sp.

♂. Closely allied in some respects to *C. singularis*, connecting that species with *C. 6-maculatus*. Head narrowing rapidly behind, trapezoidal. Surface puncto-striated; eyes prominent, front deeply excavated; antennal groove well marked; orbits silvery; antennæ very long and slender, scape long, entirely yellow, joints of flagellum piceous black, paler at base; middle joint subdentate, fourth joint thickened and flexed beneath, terminal joint long obconic; ocelli prominent; clypeus black, with silvery pubescence; mandibles yellow, black at base and tip. Thorax pilose; on prothorax two broad fasciæ, tubercle yellow, ocellated with black.

Two geminate lunate spots on the meso-scutum. Propodeum covered with a net-work of confluent rugæ, enclosure obsolete; mesial furrow deep and distinct; wings a little clouded with the usual violaceous reflections. Fore legs entirely yellow; femora dilated behind, with a sharp spine near the middle, with a fringe of hairs; middle legs yellow, femora and tibiæ slightly shaded with fuscous brown behind; hind femora brown black beneath, above testaceous; middle and hind tarsi with tip of basal and four terminal joints dark, glaucous brown. Abdomen high, ovate, subpedunculate, shorter than head and thorax together; on second ring are two ovate fasciæ closely approximate; the other four decreasing in size, becoming more pointed above and more lateral.

Length of body, .48; head and thorax, .25, abdomen, .23 inch.

Illinois, (Coll. Ent. Soc. Phil.).

In the subpedunculated abdomen this species approaches *C. 6-maculatus*, but differs totally in the characters exhibited in the head and thorax, and in the coloration of the abdomen. From *C. quadriceps* ♂, it may be known by its head being broader behind, being more trapezoidal than angular when seen from above, and also by the pale yellow legs.

Group *E*.*Crabro paucimaculatus*, n. sp.

♀. Head two-thirds as long as broad, not so cubical and angular as usual, since it rounds behind more than usual, and the eyes are larger, broader and more globose, swelling out beyond the head more than usual. Vertex broad, slightly convex; ocelli remote from each other, arranged in a low triangle; a few long hairs in front of the ocelli; antennal groove deeply channelled, narrow, orbits broadly lined with a silvery pubescence; clypeal region silvery, clypeus one-half as long as broad, being much shorter than in *C. 6-maculatus*; well carinated. Mandibles distinctly tridentate, middle tooth largest, inner tooth scarcely smaller than the outer; yellowish testaceous, polished, ferruginous towards tip. Antennæ slender, scape long slightly dilated, with an inner brown stripe, flagellum brown-black. Head closely punctured, punctures larger than usual, though not so coarse as in *C. interruptus*.

Thorax deeply punctured, punctures dense and coarse. Prothorax narrow, scutum divided by a deep notch; on each side a low sharp carina, but the sides are not angulated. A testaceous dull spot on each side; tubercle yellow with a ferruginous tinge; meta-scutellum unusually large, with a hemispherical ferruginous yellow small mesial spot. Shape of the thoraco-abdominal ring (propodeum) much as in *C. 6-maculatus*, but the surface is simply rather coarsely punctured, but not lineated, the anterior is separated from the posterior part of the ring by a raised ridge: the ridges are inclined a little downwards posteriorly. Tegulæ black; wings darker than usual, near the tips a dusky minute dot on the extremity of subcostal nervure; nervures brownish black, ferruginous near the base of the wings. Legs unusually dark: fore and middle femora touched with ferruginous at tip, minutely pubescent, hind femora black; tibiæ dull yellow in front, black behind, third tibiæ almost entirely yellow, base and tip black externally; joints of tarsi long and slender, dark brown, thickly and finely pubescent.

Abdomen much as in *C. 6-maculatus*, but slenderer and more convex above, basal ring being much longer and narrower; six spotted, one pair of orbicular spots on second, one on the fourth ring more ovate, and a pair of minute dots on the fifth ring, the pair of fasciæ being nearly obsolete; tips broadly triangular, very acute, as broad at base as its entire length; being more than one half broader and shorter, and less deeply channelled than in *C. sex-maculata*.

Length of body, .33 ; head and thorax together, 18 ; abdomen, 15 inch.

Illinois, (Coll. Ent. Soc. Phil.).

Its three-toothed mandibles, non-striated enclosure of the propodeum, coarsely punctured head and thorax, shorter interspaces of the wings and dull colors ; also the other wing characters, the slightly subpedunculate abdomen and long, slender legs will easily separate this interesting species from *C. sex-maculata*, to which it is allied.

***Crabro auriceps*, Cresson.**

*C. auriceps*, Cresson, Proc. iv. p. 150. (1865.)

Into this section falls this interesting species. Its head is still more cuboidal than in the preceeding species, being as long as broad and square in front, like the ♀ of *C. quadriceps*, while the abdomen is much more pedunculate, the basal joint being nodose above.

This is an instance of the great variability of the species of a genus of wide geographical range in those characters which are structural, and scarcely specific, as in the present species-where the head is remarkably large, and the attachment of the abdomen to the thorax much attenuated. In these tropical species much more of the body is highly colored than in those inhabiting the temperate zone ; as in the present instance, where the scutellum is not only yellow, but also the side pieces as well as a slight spine just above the insertion of the wing.

Cuba, (Coll. Ent. Soc. Phil.).

***Crabro sex-maculatus*, Say.**

*Crabro sex-maculatus*, Say, Keating's Narr. Long's Exp. p. 341. (1824.)

Harris, Cat. Ins. Mass. p. 68. (1835.)

Smith, Cat. Hym. Br. Mus. iv. p. 418. (1856.)

Cresson, Proc. iv. p. 485. (1865.)

♂. Short, thick and stout. Head larger than usual, in form not differing essentially from the ♀, being cuboidal, about one-fourth broader than long, not narrowing behind any more than in ♀, nor does the front differ. The head is a little more coarsely punctate, black, no hirsuties in front, orbits as usual silvery, clypeal region silvery, clypeus itself prominent, well carinated, black beneath the pubescence. Mandibles with a large acute tooth just inside the middle of inner margin ; usually black with a yellow streak in the middle, or pale yellow, and black at base and corneous at tip. Antennæ long and slender, scape slender not dilated, but a little angular, yellow with a black ovate spot on the inside, flagellum black, slightly toothed beneath.

Thorax more coarsely punctured than in ♀ ; prothorax yellow, in-



interrupted mesially, tubercle yellow; a yellow line on the meta-scutellum only, present in my specimens. The metathorax is roughened especially on the sides which are traversed by coarse thin parallel folds, no distinct enclosure demarked; mesial furrow narrow, and terminates just below the bend of the scutellum. Wings a little clouded and iridescent, tegulæ darker than usual, coxæ of fore legs black; femora black at base and externally, but within and towards the tip yellow testaceous; tibiæ long and slender, simple, not dilated, yellow testaceous within, tarsi pale yellow, dark at tips of joints; middle femora black, yellow at tips, tibiæ yellow, black ovate spot within; first tarsal joint no longer than the two succeeding ones together, the terminal joint being unusually long, thus greatly differing from ♀; pale but dark at tips: hind femora long and black, tibiæ yellow, black at tip, with a black streak running inwards; tarsi pale, broadly annulated with black at the tips of the joints.

Abdomen ovate polished, very slightly subpedunculate; yellow lanceolate ovate fasciæ on front margin of second and fourth rings; on fifth and sixth they form continuous bands on the front margin, or sometimes separate, when the fasciæ are broader than those in front. A slight line on the sixth ring. Tip spatulate as usual.

Length of body, .40; head and thorax together, .20; abdomen, .20 inch.

♀. Head and thorax rather coarsely puncto-striated; head not pilose in front, the usual lining of silvery pile on each side of antennal groove broader than usual; clypeus black, whole clypeal region silvery; mandibles black, on upper edge of basal half an ovate whitish-yellow spot, tips not paler than at base, though as a rule, the mandibles are pale yellow, corneous at tip and black at base. Scape of antennæ entirely yellow, or stained black on the inside, flagellum black, joints moderately long, slightly clavate.

Thorax anteriorly puncto-striated, metathorax smooth, quite free from hair, no distinct enclosure on meta-scutellum, but the fine striæ curve outwards from the mesial line, until towards the abdomen they become transverse. In some specimens striæ are slightly raised along a curved line dividing off a hardly perceptible lunate enclosure. An interrupted yellow fascia on prothorax, varying in size and intensity of color, sometimes slightly fuscous, a yellow stripe on meso-scutellum, often absent or only represented by geminate dots; tubercle yellow. Wings as usual slightly clouded, nervures dark, testaceous. Legs much alike in coloration, coxæ and femora black; tip of fore femora

often yellow outside; tibiæ entirely yellow, or with a dark fuscous stripe on the inside; basal joint of tarsi yellow, terminal ones brown.

Abdomen smooth, polished, black with three pairs of straight, lanceolate ovate fasciæ, one each on second, fourth and fifth rings; basal pair approximate closely on notum, while the third pair meet nearer; hind margin of fifth ring hirsute, tips black hirsute; beneath black.

Length of body, .40—50; head and thorax together, .26; abdomen .24 inch.

Maine, Packard. N. H., (Blake). Mass., Shurtleff, Sanborn, (Coll. Ent. Soc. Phil., Coll. Harris, B. S. N. H.). Canada, N. Y., Penn., Del., Ill., Colorado Territory, (Coll. Ent. Soc. Phil.).

A specimen from Canada differs in being a little more hirsute than the others, thus resembling more the ♀. All the ♂♂ thus far noticed are smaller than the ♀.

As noticed by Mr. Cresson, the specimens from Colorado Territory have a different *facies* from those found to the eastward. The fasciæ are whiter, an ovate yellow spot sometimes appears on the third ring of the abdomen which has also been noticed in a specimen from Illinois, and the fasciæ on the fifth ring are generally confluent. Again, there are others which are closely similar to the Eastern individuals. In a specimen from New York the thorax is almost entirely black, the single yellow stripe on the meso-scutellum being reduced to two geminate dots.

The very white striped specimens are immature, as we have noticed a portion of the semi-pupal membrane still attached to the base of the abdomen in an individual of this species from Colorado Territory.

In Dr. Harris' collection is a cocoon of this species which is a little over half an inch long, of dense consistence, and yet rather thin, regularly cylindrical, red in color. The species burrows in decayed wood. Found thus in willow wood at Dublin, N. H., by Mr. Leonerd, June 10.—Dr. Harris' notes. See also Wm. Cowpers notes on the habits of this species, Can. Nat. Geol., Dec., 1865, fig. 4, 5, identified from a specimen kindly forwarded by him.

This, our most common species will be easily recognized by the absence of any fasciæ on the third abdominal segment, and by its ovate subpedunculate abdomen.

***Crabro trifasciatus*, Say.**

*Crabro trifasciatus*, Say, Keating's Narr. Long's Exp. App. p. 342. (1824.)

Smith, Cat. Hym. Br. Mus. iv. p. 419. (1856.)

♂. Closely approaches *C. 6-maculatus*, but the body and especially the abdomen, is flatter, and as a rule there is present an abbreviated

yellow spot on each side of the third ring of the abdomen. Head of much the same proportions as described in *C. 6-maculatus*, but more coarsely punctured; slightly hirsute in front of the ocelli and orbits, broadly lined with silvery pubescence as is clypeal region; clypeus black, convex, well carinated. Mandibles yellow, lower edge yellow, or more commonly black; tips piceous, bases black. Antennæ shorter and more clavate than in preceeding species; subclavate, visibly thickening towards the tip, yellow with a black round or ovate spot on the inside; flagellum black, fifth joint with a large rounded tooth-like expansion beneath.

Prothorax with an interrupted yellow stripe; two submesial ridges on meso-scutum; tubercle yellow; a yellow stripe on scutellum, sometimes reduced to two geminate spots; enclosure of propodeum distinct, very irregular radiating rugæ diverge from the base outwards; below is an irregular net work of pentagonal and hexagonal fossæ bounded by rugæ which have a general transverse direction; the mesial furrow is not plainly marked on the enclosure. Fore femora and tibiæ simple, femora dark, becoming much paler towards the tips, internally piceous and testaceous yellow, tibiæ and tarsi yellow, joints of latter glaucous brown towards tips, as in *C. 6-maculatus*; middle femora black, tipped with yellow; tibiæ yellow, lined with black inside; tarsi brown towards unguis; hind femora black, with a slight yellow streak at the tip; tibiæ streaked with black; tarsi broadly streaked towards tips with brown.

Abdomen short ovate, somewhat flattened, smooth and polished; on second ring two straight fasciæ much larger than the rest behind, nearly meeting; on third ring a slight short linear sinuate fascia, two-thirds shorter than the preceeding and much narrower; bands on fourth ring either disconnected or united and forming a continuous stripe; on fifth and sixth rings a continuous band, on the latter ring the band is slightly excavated on the hind edge; tip black, piceous at edge, slightly hirsute. Beneath piceous, edges of rings paler.

Length of body, .34; head and thorax together, .18; abdomen, .16 inch.

Differs from *C. 6-maculatus* ♂ in its flatter body, the short stripe almost uniformly present on the third abdominal ring, in the more coarsely punctured head and thorax, the rugose propodeum and more clavate antennæ, and is on the average one-fourth smaller.

♀. Differs from the ♂ in having simple untoothed antennæ, a

more finely punctured head and thorax; enclosure of propodeum lunate, coarsely punctured, with slight radiating rugæ between the punctures, behind much smoother than in the ♂, but still rough. Legs and wings colored as in ♂. On second ring of abdomen the fasciæ are more oblique and ovate than in ♂; those present on the third ring very small, on fourth they never form a continuous band; on fifth two broad ovate fasciæ meet nearly on median line; tips much as in foregoing species, very acuminate, deeply channelled, more so than in *C. 6-maculatus*.

Differs from the preceeding species in the more rugose propodeum and otherwise as in ♂. In one specimen the fasciæ on the third ring are absent and it might thus be easily mistaken for *C. 6-maculatus*, but the flatter abdomen, smaller size and a glance at the sculpturing of the propodeum will distinguish it.

Length of body, .36, head and thorax together .18; abdomen .16 inch.

Maine, Packard. Mass., Sanborn, Shurtleff, (Coll. Harris. Ent. Soc. Phil.).

#### Group F.

*Crabro pauper*, n. sp.

♂. Head transversely cubical, much as in *C. parvulus* little more than one half as long as broad; vertex more so than in *C. parvulus*, antennal groove deep, with a very distinct ridge on the clypeal region. Clypeus large, long, being two-thirds as long as broad, distinctly though not sharply carinated, larger than in *C. parvulus*. Mandibles equally bidentate, black throughout. Antennæ thick, scape clavate, thickened sensibly towards the tip, above black, yellow at tip, beneath basal half black, but towards the base becoming fuscous, terminal half yellow; second to fifth joints of flagellum toothed beneath. Surface of body and thorax finely punctured and polished.

On each side of the prothorax, separated by the mesial notch are three ridges; that on the anterior edge forms a sharp carina, the two behind are rounded above and diverge from the front carina, the two anterior ones terminating in slight denticles. The scutum has the anterior raphe and two submesial ridges well marked, the scutellum is rather coarsely striated, black; on the meta-scutellum is a conspicuous yellow stripe.

The mesial furrow on the enclosure of the propodeum is well marked, broad, and widening towards the base, and again forms a lozenge-shaped area on the posterior portion; each side of the enclosure, which is long and large, forms a quadrant in shape, the

surface being coarsely and irregularly rugose, being a net-work of deep fossæ of unequal size, each with angular sides enclosed by high thin rugæ; on the hinder portion of the scutellum two longitudinal rugæ enclose two long fossæ on each side of and parallel to the mesial furrow. Tegulæ and nervures nearly black, pterostigma dark ferruginous; wings slightly clouded, iridescent. Fore femora brown in front, on the sides black, beneath, a yellow stripe; middle femora yellow at tip beneath forming a yellow triangular spot; hind pair entirely black; fore tibiæ yellow, stained with fulvous on the inside; middle pair yellow on the inside, a black stripe; hind tibiæ smooth, not spinulated, yellow, tipped with ferruginous at base and tip where it extends up towards the middle of the joint: joints of fore tarsi pale rusty brown, middle and hinder pairs of a much darker brown.

Abdomen not much longer than the thorax, rather narrowly ovate, convex above, and beneath in the middle. Five pairs of ovate fasciæ, not sinuate, on second—seventh segments, decreasing in size from the basal pair; the last pair minute, linear, nearly obsolete. Beyond the basal pair the fasciæ are situated far down on the sides, being remote above on the notum.

Length of body, .24; head and thorax, .14; abdomen, .10 inch.

Brunswick, Maine, Packard. W. Va., (Ridings Coll. Ent. Soc. Phil.).

A little smaller specimen from the same locality has but a single pair of yellow fasciæ on the second ring of the abdomen.

Compared with *C. parvulus*, this species is of about the same size, and differs in having the prothorax and meta-scutellum banded with yellow. The tegulæ are much darker, and also the nervures of the wings, and on the abdomen the fasciæ are much longer and narrowly ovate. While the legs in *C. parvulus* are unusually black, the present species will be easily known by the fuscous band on the front of the fore femora. Likewise the mandibles of *C. parvulus* are partially yellow, while in this species they are entirely black, though this is a variable character.

The unusually coarsely rugose propodeum will further seem to distinguish the species, which is among the smallest belonging to this section of the genus yet observed.

It differs also from *C. brunneipes* ♂, in that the fasciæ on the abdomen are broadly separated on the fifth and sixth rings instead of being a continuous band as in that species, and the other fasciæ are more ovate, not being sinuate. The metathorax differs entirely, while the femora of *C. brunneipes* are black brown.

Two ♂ specimens from Maine differ from those described above, in being a little longer and slenderer, scape blacker; hind tibiæ a little blacker within. One of the specimens has no yellow stripe on the meta-scutellum; the band on the front edge of the sixth abdominal ring is a little larger and better marked and the abdominal fasciæ in front are smaller.

*Crabro denticulatus*, n. sp.

♂. Head much as in *C. pauper*, but the eyes reach farther back on the vertex, which is flatter, otherwise the shape and puncturation of the head is much as in *C. pauper*. Clypeal region silvery, clypeus longer than in the other species, subacutely produced. Antennæ long and slender, scape almost entirely yellow, slightly stained with brown on the inside; second joint of flagellum one half as long as scape, with two remote, acute, prominent teeth on the under side, the basal one the larger; remaining joints separated by slight sutures, black; mandibles black, smoother than in *C. pauper*.

Prothorax not very broad, rounded at the sides, a convex ridge on hinder margin. Meso-thorax finely puncto-striated, submesial ridges slight, between which the surface is plainly depressed; parapsidal grooves distinct though minute; two yellow dots on each side of the front edge of the scutellum, a transverse stripe on meta-scutellum. On meta-scutellum a lunate enclosure with five rugæ on each side of broad mesial furrow, at the base of which is an abbreviated ridge. The sculpturing of the meta-thorax on much the same plan as in *C. pauper*, but the posterior ovate areas are crossed throughout by oblique ridges. Wings as in the preceding species. Fore and middle femora black, tipped broadly with yellow; hind femora entirely black; fore tibiæ, yellow, slightly stained with pale fuscous brown on the inner side; middle tibiæ with an ovate black spot near the tip, and the hinder pair are yellow tipped with black: fore and middle tarsi yellow, tinged slightly with fuscous, unguis brown; hind pair yellow on basal half of first joint, beyond glaucous brown.

Abdomen as long as the head and thorax together, with ovate fasciæ on the second to fifth segments, the spots acute inwards, not very remote from each other, those on fifth ring forming a continuous band.

Length of body, 34; of head and thorax together, .17; abdomen, .17 inch.

Virginia, Ridings, (Coll. Ent. Soc. Phil.). N. Y., (Mr. Norton).

Closely allied to *C. pauper*, but differing in the sculpturing of the metathorax, in that the fore femora are broadly tipped with yellow,

with no fuscous tints. The meso-scutellum and meta-scutellum are marked with yellow, the vertex is not so convex, and the prothorax is a little broader and the clypeus a little longer, the teeth of the antennæ are longer and scape more yellow, and the fasciæ of the abdomen are much longer and narrower in proportion. In the propodeum of *C. denticulatus* the mesial furrow disappears below the enclosure, but is developed below this point into a large triangular fossa, the bottom of which is concave and corrugated. In two specimens from New York, the fasciæ approach very closely, and in one specimen the fourth pair of fasciæ unite to form a continuous band.

*C. tenuiglossa*, n. sp.

♀. Head of much the same form as in *C. pauper*, but a little shorter, and the eyes are more contiguous; vertex convex, not broad, slightly channelled in front of the anterior ocellus, all three of which are arranged in a curved line forming a low triangle. Orbits lined with a coarse yellow pubescence of a deeper tint than the clypeal region which is more silvery on the ends of the hairs. Mandibles long and slender, almost unidentate, the two terminal teeth minute and rounded, black. Lingua greatly elongated beyond the two broad lateral lobes, compressed at the end, tip hirsute as usual, not expanding. Joints of both pairs of palpi expanding towards tip where they are testaceous, and at base fuscous. Antennæ filiform, scape slightly swollen in the middle, entirely yellow, flagellum entirely black, joints short, sutures distinct, terminal joints long obconic.

Surface of prothorax flattened and obsoletely carinated, angular on the sides, with a slight mesial notch separating two yellow patches; meso-scutum thickly punctured, raphe and submesial ridges nearly obsolete, parapsidal grooves form faintly impressed lines, scutellum punctured, black; meta-scutellum smooth, elevated, short, with a narrow transverse linear yellow line. Propodeum with a distinct semiovate enclosure in which the mesial furrow expands into a long, broad hexagonal area, and on each side are three fossæ, two of which are basal and subquadrate, the other semi-ovate and situated on each side of the square enclosure succeeding the basal hexagonal one: below the furrow contracts, and is crossed by ridges. Sides of the scutellum smooth, transversely striated becoming on the extreme flanks; situated on each side and parallel to the furrow, is a longitudinal depression, in which the striations become curved. The flanks are smooth and punctured on the convexities, and striated on the concave portions. Tegulæ testaceous, hinge pieces of wings darker, nervures fuscous, pterostigma

concolorous, wings slightly clouded on the upper half, fore femora black, with a long triangular yellow stripe at tip, two hind pairs entirely black; tibiæ entirely yellow, except on hind pair which are black at tip, thickly spinulated, spinules not however arising from tubercles; tarsi all brown black.

Abdomen long and narrow, convex above and beneath, a little shorter than the head and thorax together; basal ring considerably swelled and separated by a well defined suture from the succeeding segments. Lateral fasciæ yellow, not sinuate, none on basal ring, and diminishing in size from first pair, and thus growing more remote above. Two terminal joints of the abdomen unusually hirsute, tip broadly spatulate, sides slightly ridged, surface broad and flat.

Length of body, .30; head and thorax together, .16; abdomen, .14 inch.

Illinois, (Coll. Mr. Norton).

This interesting species may be at once known by its obsoletely bidentate mandibles, its peculiar sculpturing of the propodeum, and its broad spatulate hirsute tip. It is not usual for the fifth ring to be so hirsute. Also the well spinulated tibiæ, the spinules not as usual when present, arising from stout tubercles; together with the inflated basal ring of the abdomen, which is entirely jet black,—present trenchant characters which show it to be a transitional form connecting *C. pauper* and *C. denticulatus* and its allies, all being undersized species with rather stout bodies, and the abdomen much stouter than the head and thorax together—with *Thyreopus vicinus* and the species allied which have a short head, the abdomen longer than the head and thorax, and a spatulate tip, not pinched up and deeply channelled as usual in the more typical forms of the genus *Crabro*. The remarkable length of the much compressed lingua, the tip of which extends an unusual distance beyond the lateral lobes, is an interesting characteristic of this species.

#### Group *G*.

*Crabro obscurus*, Smith.

*Crabro obscurus*, Smith, Cat. Hym. Br. Mus. iv. p. 418. (1856.)

♀. Head a little less than one-half as long as broad, being transversely oblong, but a little shorter than in *C. 6-maculatus*; vertex flattened, a little depressed below the surface of the eyes, which reach nearer the posterior edge of the occiput than in *C. 6-maculatus*, and thus this portion of the vertex forms an imperceptible ridge behind the ocelli which are arranged in an equilateral triangle; front encroaches slightly



on the eyes, which are consequently slightly indented, deeply canalculated, a raised line going from the anterior ocellus direct to the broad, smooth, sunken antennal groove. Surface more finely punctured than usual; orbits and clypeal region golden; clypeus much longer than in *C. 6-maculatus*, front edge being very convex and elongated; lateral lobes larger and more broadly triangular than usual. Antennæ moderately long, scape slightly thickened in the middle, slightly angulated, entirely yellow; flagellum clavate, joints long and slender, thickened towards the tip, sutures very distinct; basal joint long, yellow at base, terminal half dark ferruginous, second joint twice as long as the succeeding one, terminal joint long obconic.

Thorax short, thick globose, being very convex above; an interrupted yellow line on the prothorax; tubercle yellow; two submesial ridges on the high and narrow, finely punctured mesoscutum, the scutellum unusually raised and convex, finely punctured, polished and smooth, black; meta-scutellum with a yellow stripe, roughened on the hinder edge. Enclosure of propodeum distinctly lunate, raised perceptibly above the surface; median furrow slightly dilated at base, slightly raised lines diverge outwards from the furrow; a transverse raised line just behind the enclosure bounds above a large oblong space situated on each side of the median furrow, while above the line is a transversely wedge-shaped area widening outwards on the flanks. Neuration much as in *C. 6-maculatus*, there is a tendency however of the outer submedian recurrent to be curved transversely instead of obliquely and bent inwards on the internal nervure; tegulæ and nervures dark testaceous. Fore and middle femora black, yellow at tip above; fore tibiæ yellow shaded with brown ferruginous within; middle tibiæ entirely yellow, or shaded slightly within with dark ferruginous; tarsi yellow throughout; hind femora black, tibiæ yellow, tarsal joints with glaucous tips.

Abdomen broadly ovate, flattened above, much as in *C. singularis*, beneath convex, shorter than the head and thorax, very finely punctured, polished smoothly especially on the immaculate basal joint; narrow yellow fasciæ on each of the succeeding rings, acutely pointed inwards, extending inwards one-third of the entire breadth of the upper side, the first pair being the most ovate, and the last pair are most approximate. Tip very acute, compressed, deeply channelled, elongated, the walls nearly meeting over the deep, narrow groove, thus differing much from the triangular groove in *C. 6-maculatus*. Beneath entirely black; a slight hirsuties on the flank of thorax and head.

Length of body, .38 ; head and thorax together, 20 ; abdomen, .18 inch.

Conn., (Norton). Penn., (Coll. Ent. Soc. Phil.).

In its general form and structure this species, like the following one, connects *C. quadriceps* with the more genuine *Crabrones*. Its golden tint and long clypeus, the sculpturing of the propodeum and long, smooth, slightly dilated femora, and eight acute narrow abdominal fasciæ, and the pointed, deeply channelled tip, together with its rather small size, will readily enable this interesting species to be recognized.

The specimens received from Mr. Norton differ from the others in having broader fasciæ which are a little more contiguous above, while the most posterior band is broader and united in the middle.

*Crabro montanus*, Cresson.

*C. montanus*, Cresson, Proc. iv. p. 464. (1865.)

Colorado Territory, (Coll. Ent. Soc. Phil.).

*Crabro contiguus* Cresson.

*C. contiguus*, Cresson, Proc. iv. p. 484. (1865.)

Colorado Territory, (Coll. Ent. Soc. Phil.).

#### Group *H*.

*Crabro oristatus*, n. sp.

♂. Head cubical, two-thirds as long as broad, hardly narrowing behind more than in females generally in this genus; vertex broad convex, especially at site of ocelli, which are arranged in a low triangle, and are quite contiguous; front narrow, eyes converging a little more than usual, antennal groove bounded above by a broad and deep ridge angular at bottom, orbits lined with a slight silvery pubescence; clypeal region silvery, of the average width; clypeus itself three-fourths as long as broad, well carinated. Mandibles entirely black or yellowish in the middle, on inner edge a large triangular acute tooth. Antennæ unusually stout, scape broadly dilated and slightly hirsute on edge, angulated, black brown with ferruginous tinge on the inside and on whole basal third, yellow towards tip, first and third joints of antennæ ferruginous, darker at base; joints of flagellum short and thick, five basal joints dentate beneath. Surface of head rather coarsely puncto-striated.

Prothorax square, well crested, carina ending in an acute angle; on each side a yellow ovate fascia enclosing the carina. Surface of the mesoscutum with unusually large, coarse punctures and longitudinal raised, irregular lines; two submesial ridges very prominent, and terminating in slight lines to hinder edge of scutum; tubercles slightly pupilled with

black; scutellum coarsely punctured, not striated, on front margin two yellow stripes on each side directed towards the insertion of the wings; postscutellum smooth though not polished, yellow. Propodeum with a narrow sublunate enclosure, with a large, broad mesial furrow; on each side about ten diverging raised ridges of unequal length; posteriorly are four transverse ridges, with much finer longitudinal lines between; a slight ridge bounds the sides. Fore femora black above, yellow beneath; middle femora black, yellow on the outer half beneath; hind femora entirely black; tibiæ yellow with a black stripe externally, on hinder tibiæ black margined inside with ferruginous, with a yellow stripe; fore tarsi with two basal joints paler whitish testaceous, third, fourth and unguinal joints brown black, middle and hind tarsi brown, becoming darker on outer side, and towards ungues. Wings slightly clouded, nervures dull ferruginous, especially on the costal edge, tegulæ ferruginous, hinge pieces blackish.

Abdomen broad and short, somewhat flattened, not very convex beneath, with four pairs of fasciæ and two terminal continuous bands; two basal fasciæ triangular, opposite sides deeply incised, three succeeding pairs entire, slightly sinuate, those on second ring largest and nearer together than any of the others: two continuous bands on the fifth and sixth rings, slightly sinuated. Tip triangular, truncate, minutely hirsute. Beneath black, edges of rings paler, minutely hirsute.

Length of body, .34; head and thorax together, .19; abdomen, .15 inch.

Colorado Territory and Illinois, (Coll. Ent. Soc. Phil.).

A specimen from Illinois has the mandibles yellow externally in the middle, scape of antennæ more yellow, popodeum a little more coarsely striated, tibiæ more yellow, and abdominal fasciæ are twice farther apart; the tip is plainly grooved, where in the specimen from Colorado it is faintly marked, so that we may consider the two forms as geographical varieties and as an evidence that the fauna of Colorado Territory is distinct from that of the Mississippi valley. From *C. montanus* this species which nearly approaches it, may be known by its slightly shorter head, black mandibles, the lower third of the scape being black; by the striated meso-scutum, which in *C. montanus* is only punctured; the prothorax is a third broader and on the abdomen the two terminal bands are represented by two pairs of orbicular fasciæ in *C. montanus*, which also has nearly black legs.

*Grabro brunneipes*, n. sp.

♂. Head cubical, edges rather square, nearly two-thirds as long as

broad. Eyes prominent globose, more so than in *C. parvulus*; ocelli larger and more closely arranged in a equilateral triangle, on a more than usual convex vertex; surface of head more coarsely punctured and eyes a little more contiguous than in *C. parvulus*, so that the front is narrower than usual; no raphe leads from anterior ocellus to the antennal groove which is deep, and the orbits are narrowly lined with a slight silvery pubescence; in front the head narrows rapidly towards the insertion of the mandibles, and the clypeal region is consequently narrow, the clypeus itself long and narrow, slightly carinated especially towards the base, but surface rather flat, front edge much produced, obtusely pointed; tip small truncated, surface covered with a bright silvery pubescence. Mandibles long, slender, smooth, highly polished, nearly equally and very acutely bidentate. Antennæ rather stout and thick, scape dilated, yellow beneath, basal half black; flagellum black, basal joint slightly ferruginous, sutures well defined.

Prothorax well carinated on each side of the broad mesial notch, black; tubercle yellow, central raphe and submesial ridges on meso-scutum well marked. The thorax is rather coarsely puncto-striated for species belonging to this section, a narrow yellow stripe on the meta-scutellum. Enclosure on the propodeum distinct, sublunate, with a broad, flat and shallow mesial furrow, including irregular diverging and transverse lines; on each side of the furrow are about five parallel ridges; on the vertical face of the segment which is somewhat hexagonal are transverse, slightly curved somewhat irregular lines; flanks of thorax ridged coarsely and covered with soft silvery pubescence. Tegulæ blackish, wings slightly smoky, nervures dark ferruginous. Fore femora, dark brown, tibiæ brown within, externally yellow; tarsi pale brown, a little darker towards the ungues; middle femora tipped slightly with yellow; fore tibiæ yellow externally, while the hind pair are almost entirely yellow, stained with brown internally, and the surface is finely pubescent and slightly spinulated; hind tarsi dark brown.

Abdomen broadly ovate, slightly flattened, convex above and below basal joint very broad, immaculate. Three pairs of lateral ovate yellow fasciæ on second, third and fourth rings; on fifth and sixth they form continuous bands on the front edge of each ring, slightly sinuate behind. The first pair of fasciæ are larger, broader and more sinuate than those behind. Beneath dark brown, edges of segments paler.

Length of body, .28; head and thorax together, .16; abdomen, .12 inch.

Penn., (Coll. Ent. Soc. Phil.). Maine, (Packard).

This species is characterized by the unusual convexity of the vertex, the ocelli being more curved together and raised more than usual; eyes more globose, and in front nearer together, also by the unusual style of sculpturing of the propodeum; the legs are brown, as in the abdomen beneath.

From *C. parvulus* it may be easily known by the head characters already referred to, and by the distinctly carinate prothorax, while the propodeum is much more coarsely ridged, and the legs are brown, instead of black, a little stouter, and the two terminal abdominal bands in the present species, become in *C. parvulus* two pairs of remote lateral fasciæ.

A specimen from Maine has nearly black femora, and the terminal fascia is nearly obsolete; also the abdomen is larger and a little broader than in the specimen from Pennsylvania.

Another ♂ specimen which I captured in the Glen, White Mountains, N. H., last August on the flowers of the Golden Rod, has no terminal continuous fasciæ, but remote lateral spots; the fore femora are fuscous in front, and the tips of both the anterior pairs are yellow, and the mesial furrow on the propodeum is much narrower than in the southern specimen—while the antennæ are stained black on the inner side of the scape, and the prothorax is distinctly yellow, spotted on each side.

*Crabro effossus*, n. sp.

♂. Head short, one-half as long as broad, sides narrowing behind the eyes more than is usual, vertex convex as usual; ocelli contiguous, in a low triangle, in front a deeply impressed line leading to the deep, smooth, broad antennal groove. Surface coarsely punctulated, orbits and clypeal region with a coarse silvery pubescence: head narrows in front rapidly to the insertion of the jaws; clypeal region narrow, clypeus long, well carinated. Mandibles black, scape as usual, entirely yellow; flagellum black second and third joints with a terminal prominent stout tooth beneath.

Prothorax flattened, not carinated, surface smooth and broad, antero-posteriorly, yellow; on the mesoscutum the mesial raphe and submesial ridges well marked; tubercle yellow, coarsely punctured; scutellum puncto-striated, black; meta-scutellum smooth; with a yellow stripe. Thoracic abdominal ring with no distinct enclosure, with a deeply and irregular net-work of large deep fossæ; on the short horizontal, slightly enclosed space, they are long and narrow, below there are high transverse and longitudinal ridges, enclosing square and

irregular fossæ, no mesial furrow. Fore and middle femora broadly tipped with yellow, hind pair black; two anterior pair of tibiæ yellow, streaked within by black lines, posterior pair tipped narrowly with black; anterior and middle tarsi yellow, posterior black.

Abdomen long and narrow, equalling in length the head and thorax, narrower than usual; basal ring immaculate, four pairs of short ovate non-sinuate fasciæ, situated on the front edge of each ring; first pair largest and broadest, three succeeding pairs longest and narrower, slightly indented on the posterior edge, equal in size; third pair very contiguous, fourth form a continuous band.

Length of body, .25; head and thorax together, 13; abdomen, .12 inch.

New York, (Norton).

Its narrow head, deep frontal impressed line, coarsely punctured body, the absence of mesial furrow on the thoracic-abdominal ring, and unusually coarse fossæ on this segment, together with its slender body and unusually narrow abdomen, the two pairs of fore femora broadly tipped with yellow, form easy characters for discrimination. The antennæ are also rather stout, but prominently toothed beneath, and it will thus be distinguished from *C. brunneipes* and its allies.

*Grabro cubiceps* n. sp.

♀. This species is in form and structure allied closely to *C. atriceps*, but the head is more cubical, being longer and narrower as its whole body is longer and slenderer, since *C. atriceps* is an unusually short and plump species. The eyes are quite remote; ocelli arranged in a low, but nearly equilateral triangle; surface finely punctured, but not very minutely so; vertex convex, full and broad, with a slight impressed line in front of the anterior ocellus; in front not deeply channelled; antennal groove large and broad, lined on each side with a golden pubescence; clypeus two-thirds as long as broad, sharply carinated, clypeal region covered with a golden pubescence which in some lights is silvery. Head in front squarer than usual, sides not converging so rapidly as usual towards the insertion of the jaws. Palpi moderately stout, joints slender, not dilated much; mandibles pale yellow, black at tip, outer side smooth, not furrowed. Antennæ short and thick, dilated sensibly beyond the middle, flagellum thickened towards the tip, joints being short and thick, brown black, scape entirely yellow.

Prothorax broad, transversely carinated on each side, acutely dentate on the side, on each half two oval lanceolate yellow stripes. Surface of

thorax finely punctured, two high and prominent submesial ridges, parapsidal groove present, at each anterior angle of the scutellum a yellow dot; meta-scutellum smooth, polished, not punctured, with a broad yellow stripe, interrupted by a deep square sinus behind. Sculpturing of propodeum closely approaches that of *C. atriceps*; enclosure of propodeum distinctly lunate, at base a row of pits, succeeded by fine radiating rugulæ; mesial furrow narrow, widening posteriorly where the segment is squarely docked, the posterior face vertical, presenting a trapezoidal face, and bounded above and on the sides by well defined ridges. Tubercle yellow, wings pale, not clouded, nervures dark, dull ferruginous, pieces at the insertion of the wing blackish.

Femora black, ferruginous at tip in front, behind a yellow dot; tibiæ yellow, black within, bordered with ferruginous in front, especially on the anterior pair; posterior tibiæ almost entirely yellow, black brown at tip; tarsi all of a peculiar dull, glaucous, testaceous hue, with a fine hirsuties, concolorous with the tibial spurs, while the joints are slightly tipped with a bright ferruginous, polished tint.

Abdomen broadly ovate, flattened above, below concave, smooth, polished; with four pairs of fasciæ on second to fifth rings. The first pair are longest, being hardly sinuate, second pair are farthest apart, second and third are equal in size, fourth larger, broader, more orbicular and nearly contiguous; tip mucronate, triangular, at base not quite one-half as broad as long, being suddenly contracted at the middle, and deeply channelled towards the extremity; slightly hirsute, posterior edges of rings with a few scattered hairs.

Length of body, .33; head and thorax, .18; abdomen, .15 inch.

Illinois, (Coll. Ent. Soc. Phil.).

Compared with *C. atriceps* this species has a longer and narrower head, the peculiar carination of the prothorax is sharper, while the sculpturing of the thorax is otherwise much the same; the tibiæ are stouter and very differently colored, while both agree closely in the coloration of the abdomen, though the tip of the present species is narrower and longer than in *C. atriceps*, which last varies greatly in the relative size and distance apart of the abdominal fasciæ.

It may also be known by its unusually cubical head, the yellow clypeal region; its two submesial ridges on the scutum, its finely striated enclosure on the propodeum, and want of fasciæ on the basal ring of the abdomen.

From *C. montanus* it also differs, while similar in abdominal characters,

in its antennæ having the scape entirely yellow, instead of being striped with black, and in *C. montanus* the slope of the propodeum is very great, while in the present species it is nearly horizontal, and in size much smaller, and the meta-scutellum is entirely black.

A specimen from Brunswick, Maine, has the inner side of the basal three-fourths of the scape black, a yellow stripe on the prothorax interrupted more on the mesial line than in the Illinois specimens; the enclosure of the propodeum is much more coarsely striate, there being one-half as many rugæ, thus showing that the amount of striation of this triangular area, though generally very useful in distinguishing the species, cannot always be depended upon. Also, the fore femora are entirely black, and the middle femora are provided with a yellow dot at the tip, instead of being ringed with yellow, while the abdominal fasciæ are a little broader, and the terminal pair are ovate, instead of round as in the specimens from Illinois.

Found flying about *Spiraea alba* in August.

*Crabro corrugatus*, n. sp.

♀. Head cubical, finely punctured, a little more than one-third as long as broad; vertex convex, not channelled towards the antennal groove, ocelli arranged in a low triangle, anterior one in a well marked circular depression. Antennal groove lined broadly on each side with a very fine silvery pubescence, finer than that on the outer side of the orbits; clypeal region silvery, clypeus nearly two-thirds as long as broad, well carinated; mandibles tridentate, teeth acute as usual, greenish yellow in the middle. Palpi fuscous, joints of moderate width, the terminal one long, slender obconic, one-third longer than the penultimate. Antennæ clavate, towards tips closely jointed, sutures slight, scape clavate increasing in width gradually towards the tip, pale yellow with a broad, ovate black patch above, flagellum black.

Prothorax not so broad as usual, not angulated on the sides, mesial notch well defined, the length, antero-posteriorly of the scutum is greater than usual, each half yellow, slightly carinated on the front and hinder edge, not however, as usual, terminating in well marked denticles, surface concave slightly. Mesoscutellum unusually smooth, being very finely puncto-striated, the anterior raphe and submesial ridge plainly marked; scutellum puncto-striated; meta-scutellum smooth, yellow: propodeum with a broad mesial line, dilated at base and on the posteriorly vertical face, with four transverse ridges; on each side a few large, remote curved, sinuate, irregular ridges, with abbreviated, transverse, smaller rugæ. Each side of the enclosure is sub-



quadrate in form, a high ridge separating the anterior from the posterior area of the scutellum; the vertical posterior portion is low mitre shaped, divided by the mesial furrow, enclosed by high ridges and traversed by four slight ridges obliquely directed upwards. Sides of the thorax lineated by raised lines, tubercle smooth yellow. Tegulae black, nervules unusually dark, wings slightly clouded, iridescent. Femora black, slightly tipped with yellow, especially on the fore legs; fore and middle tibiae yellow, with an oval spot within, on the hind tibiae a slight brown stain; tarsi brown throughout.

Abdomen black, with four pairs of lateral, broad, ovate, non-sinuate yellow spots beginning on the second ring, last pair not contiguous as usual; tip much as in *C. cubiceps*, though narrower and deeply grooved.

Length of body, .30; head and thorax together, .17; abdomen, .13 inch.

Western Virginia, (Mr. Ridings, Coll. Ent. Soc. Phil.).

This interesting, and in some respects peculiar, species is closely allied to *C. cubiceps*, though differing in the remarkable sculpturing of the metathorax; in the narrow prothorax which is unusually long; in that, the last pair of fasciae on the abdomen are unusually distant, being placed far down on the base of the ring. The prothorax in this group is usually broad and thin and well crested, but in the present species it presents a broad slightly channelled surface. The punctures are unusually fine, the surface of the head and thorax being smooth and almost polished. The surface of the anterior part of the meso-scutum enclosed between the submesial ridges, are more than usually hollowed out. In its few large corrugations or ridges on the metathorax it will be readily distinguished from its allies.

*Crabro parvulus*, n. sp.

♀. Head very cubical, almost square above, vertex broad, full and convex, front full, not channelled, a slight impressed line in front of the median ocellus; ocelli arranged in a low triangle. Eyes not far apart as usual in front; antennal groove deep, bounded above by a slight rim, on each side orbits lined with a silvery pubescence. Clypeal region silvery, head in front narrows rapidly towards the insertion of the mandibles. Clypeus broad and short, one-half as long as broad, tip broadly truncate, surface flattened, with a well marked carina. Mandibles black, with a pale yellow, ovate, lanceolate, mesial spot. Antennae rather thick, clavate, scape unusually thickened towards the tip, black, tip yellow, streak extending downwards on the

outside in a yellow streak; flagellum black, first joint polished, remaining ones dull black. Surface of the head minutely punctured. Prothorax narrow, high and convex, mesial notch deep; lateral surfaces obscurely channelled, sides rounded not angular, black.

Surface of thorax minutely puncto-striated. Mesoscutum with mesial and submesial lines very distinct; parapsidal grooves slightly marked. Surface entirely black except the yellow lateral tubercles. Scutellum and meta-scutellum black, minutely puncto-striated, the latter especially so. Propodeum with an obscure sublunate enclosure, with a basal row of small fossæ from whence diverge curvilinear minute striæ; hinder portion rather smaller than usual, with minute ridges converging towards insertion of abdomen, bounded above by a ridge which distinctly separates the two regions of the notum; mesial furrow well marked expanding on the posterior region. Coxæ and femora black, tibiæ black with a yellow stripe externally; which on the hind tibiæ is dilated towards end of joint. Tarsi ferruginous, three middle joints lighter than the rest, basal and unguital joints dark brown. Tegulæ and nervures rufous, wings slightly clouded.

Abdomen broadly ovate flattened above, beneath convex, nearly as long as the head and thorax together, surface shiny smooth, with four pairs of short, broad, ovate, non-sinuate fasciæ; basal pair on second ring twice as large as the succeeding ones, and placed on the sides, not contiguous above; tip acutely mucronate, deeply channelled above, narrow at base, hardly one-third as wide as long. Beneath black, edges of rings slightly paler.

Length of body, .28; head and thorax, .16; abdomen, .12 inch.

Colorado Territory, (Coll. Ent. Soc. Phil.).

Smaller than the allied species *C. montanus* and *C. atriceps*, and can be easily known by its black thorax and the sculpturing of the propodeum; its anterior portion being divided by the mesial furrow into two quite regular quadrants, and bounded below by the ridge, while this region is much longer than usual, and the posterior vertical portion much smaller than commonly observed. Its black thorax, the very distinct ridges on the anterior portion of the scutum, the entirely black femora, unusual style of coloration of the tarsi and black scape ringed with yellow at the tip, and the unusually cubical head when compared with *C. obscurus* and *aurifrons* will easily distinguish it.

The group of which *C. septentrionalis* and *C. cephalotes* of Europe are types, differs from the foregoing species in some remarkable characters. The head is a third shorter, and longer by a third, being unusually

transverse, oblong. The clypeal region is much broader and shorter proportionately, the eyes are larger and more globose, the front is broader and flatter. The prothorax is angulated on the sides, and the pterostigma is much more distinct than usual, while the outer side of the submedian cell, is oblique, where in *C. 6-maculatus* it is straight, also the second median recurrent terminates near the middle of the first subcostal cell, where in *C. 6-maculatus* it as usual joins the end of the space, also the legs are much stouter and more spiny than usual. In some of these characters such as the broad head and flattened body the ♀ remind us of *Thyreopus*, but a glance at the pinched, deeply channelled tip of the abdomen will easily enable the species to be separated.

#### Group I.

##### *Crabro septentrionalis*, n. sp.

♀. Head short, broad, transversely oblong, being one-half as long as broad, body long and flattened, finely punctured, vertex flattened, slightly depressed; ocelli arranged in a low triangle which is nearly equilateral; eyes wide apart as usual; surface concave in front of the ocelli; antennal groove well marked; orbits on each side lined with a broad track of golden pubescence like the clypeal region; clypeus as long as broad, acutely produced on the front edge, but truncate at tip, strongly carinated, black; mandibles as usual bidentate, yellow, black at tip. Antennæ of the usual proportion, scape a little compressed and angulated longitudinally, slightly dilated in the middle, entirely yellow; flagellum black, basal joint yellowish beneath, abdomen ferruginous.

Prothorax with two narrow yellow stripes, rather remote, one on each side. Thorax broad somewhat flattened above; on mesoscutum are two distinct submesial ridges and parapsidal grooves; surface finely and closely punctured; a slight yellow spot, sometimes absent, on the middle of the meta-scutellum. Tubercle on the flanks as usual. Enclosure on propodeum distinctly marked, semi-elliptical, mesial furrow with slightly ridged sides, on each side straight diverging rugæ of unequal length, posteriorly the lines more transverse and finer with a few scattered gray hairs. Tegulæ ferruginous, nervures dull ferruginous. Fore femora black, tibiæ yellow, ferruginous within, tarsi yellow shaded on the sides with pale ferruginous, middle femora black, yellow at tip beneath, tibiæ yellow with a large oval black spot within, hind pair tuberculated and unusually spinulated; tarsi yellowish, ungues ferruginous; hind femora black, lined within with a silvery

pubescence forming a regular line of long silvery evenly cut hairs; basal joint of tarsi yellow, ferruginous at tip, remaining joints wholly reddish.

Abdomen broad and flattened, convex beneath, a little longer than the head and thorax together, with five pairs of fasciæ, those on basal segment reduced to single square dots; those on second segment are broader than the others, third pair longer, narrower, nearly contiguous on the mesial line of the body; those on the fifth rings unite to form a continuous band, more ovate and broader than the others. Beneath black, edges of segments obscurely testaceous.

Length of body, .54; head and thorax together, .26; abdomen, .28 inch.

Hudson Bay Territory, (Coll. Norton); Maine, Brunswick, and head waters of Penobscot, (Packard).

This is apparently a member of the boreal or Canadian Fauna, as it has not been taken South of the limits of that fauna. It is not uncommon, and its broad flattened body, the golden pubescence on the front, the acute and suddenly docked clypeus, the hind femora lined with a linear brush of long, even, silvery minute bristles, and the arrangement of the abdominal fasciæ, together with the short, very transverse head, present easy marks for recognition.

It represents *Crabro cephalotes* of Europe, though differing from it in many characters of coloration and sculpturing.

*Crabro stirpicola*, n. sp.

♂. Head broad and short, punctured confluent, being one half as long as broad. Eyes small, remote, so that the front is very broad above; surface of the head convex; ocelli slightly raised, situated in a low triangle; a hardly perceptible broad depression leading from the anterior ocellus to the antennal groove, on each side of which the orbits are lined with silvery pubescence, the head narrowing rapidly towards the insertion of the mandibles, usually more than the width of this region being a little more than one-half that of the head itself; clypeus itself two-thirds as long as broad, acutely produced in front, flat, no carina seen through the silvery pubescence. Mandibles acutely bidentate, black, highly polished, with a mesial yellow spot. Antennæ stout, scape dilated, clavate, yellow, stained with brown near the base on the upper side; joints of flagellum thickened in the middle slightly, fifth joint with one larger tooth beneath; basal joint ferruginous. Head coarsely punctured.

Prothorax deeply notched mesially, each side convex, rounded, not

angular, with a yellow stripe. Meso-thorax very coarsely punctured, no mesial raphe or submesial ridges. Scutellum convex, black; meta-scutellum with a slight yellow stripe on the anterior edge. Enclosure of propodeum convex, indicated by a straight ridge passing outwards and downwards, covered with coarse irregular ridges forming a net-work of unequal fossæ; mesial furrow well marked; tubercle yellow. Wings smoky, nervures blackish ferruginous, tegulæ and wing pieces black. Femora black, slightly tipped with yellow; tibiæ yellow, striped with black inside; tarsi greenish yellow, ferruginous beyond tips of basal joint.

Abdomen considerably shorter than anterior part of the body, sub-pedunculate, the basal segment being very concave and separated from the rest by a deep suture; lateral ridges at its insertion into the thorax very large. Second segment much wider than the basal, very convex, a little more so than the succeeding ones. Three pairs of lateral fasciæ, those on the second ring being twice as large and more ovate than those on the fourth and fifth; none on the third ring, tips entirely hirsute. Beneath entirely black.

♀. Head very nearly cubical, being nearly twice longer than in ♂. Vertex very broad, convex; ocelli arranged in a low triangle; orbits broadly lined with a silvery pubescence; clypeus larger than ♂, well carinated, silvery pubescent. Mandibles large and strong, acutely bidentate, central tooth largest and longest; stained on the middle of the upper side with light yellow.

Prothorax with a slight thin carina on each side of the mesial notch; surface of thorax not so coarsely punctured as in ♂, a yellow stripe on the meta-scutellum, a little more than half as long as the width of the piece. Surface of the enclosure of the propodeum more finely and regularly striated than in the ♂, being puncto-striate, in lines diverging from the base and mesial furrow; tegulæ slightly paler than in the other sex, ferruginous. Femora swollen, black, more distinctly tipped with yellow than in ♂, tibiæ yellow externally, hind tibiæ stained brown on the inside and on the extremity. Tips mucronate, contracted near the middle, deeply grooved, narrower, base hardly one-half as broad as the length.

Length of body, ♂, .21, ♀, .24; head and thorax together, ♂, .09, ♀, .15; abdomen, ♂, .12, ♀, .09 inch.

New York, New Jersey, Ill., (Coll. Ent. Soc. Phil.; New York, (Angus); New York, (Norton).\*

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\* Makes its cells in stems of Raspberry—Angus.

On comparing the wings with those of *C. 6-maculatus*, the neurulation appears much alike. They differ in having much shorter and broader interspaces, especially the rhomboidal second median, which is considerably shorter in proportion. The species will be easily known by its six spotted abdomen, and convex contracted basal abdominal ring, giving a subpedunculated appearance to the abdomen, which is short and broadly ovate. This with its small size and cubical ♀ head and short transverse ♂ head, and coarsely punctured body, together with the absence of the mesial raphe and submesial ridges, the short interspaces of the wings, and swelled femora will easily separate it from its allies.

It structurally agrees well with *C. cæsus* from Cuba, which has entirely yellow legs, both meso-scutellum and meta-scutellum yellow, and eight fasciæ on the abdomen, the first and fourth pairs of which are united to form broad conspicuous bands, while the pubescence on the orbits and clypeal region is of a deep golden color. Its neurulation approaches *C. 6-maculatus* much more closely than *C. stirpicola*.

A specimen from Illinois has a conspicuous yellow band on the meso-scutellum, an angular yellow spot on the flanks, behind the tubercle, and the femora are more broadly tipped with yellow than in the other specimens.

***Crabro scaber*, Smith.**

*Solenius scaber*, St. Farg. et Brullé, Ann. Ent. Soc. France, iii, p. 715. (1834).  
St. Farg. H. N. Hym. iii. 123. (1845).

*Crabro scaber*, Smith, Cat. Hym. B. M. iv., p. 418. (1856).

♀. Body coarsely punctured. Head long, cubical, being three-quarters as long as broad, vertex broad convex; ocelli arranged in a slightly curved line, the anterior ocellus less than one-third as large as the two others. A very fine silvery, and in some lights, golden pubescence lines the orbits. Clypeal region silvery, clypeus golden, broad and short, well carinated. Mandibles black, basal half pale yellow. Lingua unusually long and deeply bilobate, pale testaceous; joints of both pairs of palpi a little longer and slenderer than usual. Antennæ rather stout, subelavate; scape cylindrical, entirely yellow, basal joint of flagellum yellow, as also basal half of second joint, becoming fuscous towards the end; remaining joints black. Prothorax broad, continuously yellow, narrowly and deeply channelled; front edge being carinated and ending in an acute denticle; tubercle yellow; meso-scutum with the mesial raphe and submesial ridges nearly obsolete, surface coarsely punctured. Scutellum black, metascutellum

smooth, yellow; mesial furrow of propodeum well marked, traversed by minute rugæ; enclosure sublunate, nearly obsolete, with numerous fine diverging longitudinal striæ, and on the posterior part similar fine transverse raised lines. Tegulæ and basal hinge pieces of wings rufo-testaceous, concolorous with the nervures and pterostigma, wings slightly clouded on the outer half, where the nervures become darker than on the basal half.

Legs: coxæ and femora rufo-testaceous, the latter yellowish at tips; tibiæ yellowish, beneath rufous, spinulated, though not very stoutly so; tarsi dull fusco-testaceous, ungual joint dark brown.

Abdomen considerably shorter than the head and thorax together, rings coarctate, convex, sutures well defined, surface well punctured; the first ring as in *C. cræsus* and *C. stirpicola* is separated from the succeeding ones by its unusual convexity, and contracted at the sutures, where it is slightly emarginate, black, second ring with a continuous yellow band unusually broad, but contracted in the middle. Third ring with a narrow linear continuous yellow band interrupted near the side where is a supplementary linear spot; the succeeding fasciæ of same length but broader, not interrupted, but with a deep angular sinus.

On the upper portion of the fifth ring is a broad, short fascia. Tip black, mucronate, deeply channelled, much narrower than in *C. cræsus*.

Length of body, .48; head and thorax, together, .28; abdomen, .20 inch.

Florida, (Norton).

This agrees precisely with St. Fargeau's description, and in its most important characters is allied to *C. cræsus*; the two agree in the coarctate basal ring of the abdomen, also in the slightly contracted propodeum which is more separate in this group of the genus than usual.

Likewise both species have a continuous fascia on the second and fifth rings, while in *C. cræsus* the lateral rounded ovate fascia represent the linear bands in *C. scaber*, and the meso-scutum is yellow in the former species, while in *C. scaber* it is entirely black, though this is usually a character of slight importance.

Differs in the fuscous legs and coxæ, which last are as a rule in the other species always black, and which is probably owing to its tropical habitat, as most of the species from the south are uniformly more broadly spotted with yellow; and the pubescence of the head being golden rather than silvery in its hue. The species will also be

easily identified by the fuscous tegulæ and nervures, the entirely yellow scape and base of flagellum, and finely striated propodeum.

*Crabro glauconotatus*, *C. confertus* and *fumelicus* which are MS. names proposed by Harris in his "Catalogue" of the Insects of Massachusetts, cannot hereafter be regarded, as his specimens have not been preserved, and he has left us no descriptions. The "*C. complantus* Say," is perhaps a misprint for *C. confluentus* Say, as the latter occurs in the Harris collection.

DESIDERATA.

***Crabro hilaris*, Smith.**

*C. hilaris*, Smith, Cat. Hym. Br. Mus. iv. p. 417. (1856).

"St. John's Bluff, Florida, Doubleday," (Smith).

***Crabro frigidus*, Smith.**

*C. frigidus*, Smith, Cat. Hym. Br. Mus. iv. p. 419. (1856).

"North America," (Smith).

***Crabro collinus*, Smith.**

*C. collinus*, Smith, Cat. Hym. Br. Mus. iv. p. 420. (1856).

"East Florida, Foster," (Smith).

***Crabro maculatus*, Fabr.**

*C. maculatus*, Fabr. Ent. Syst. ii, 295, 8, Syst. Piez. 309, 9.

"North America," (Fabr.).

This last species is allied to *C. vagus* of Europe according to Fabricius, which resembles closely *C. 6-maculatus* of this country, and possibly may be this most common species.

[TO BE CONTINUED.]



PROF. DANA AND HIS ENTOMOLOGICAL SPECULATIONS.

BY BENJ. D. WALSH, M. A.

In the *Proceedings*, etc., for Sept. 1864, (Vol. III. pp. 236-249), I published some remarks upon Prof. J. D. Dana's new Classification of Insects, to which he partly replies in the *American Journal of Science and Arts* for March, 1866. (Vol. XLI. pp. 163-174.)

It is not my desire further to discuss the points at issue between us. So far as I am correctly quoted, I am quite willing to stand or fall by the printed record. All I now wish is, to call attention to the fact, that in the above Article Prof. Dana has, in three several instances as recited below, misquoted me, and based arguments upon the misquoted language, which, if that language had been correctly quoted, would have fallen to the ground.

1st. In my Paper (p. 238) I had said that "As originally *expounded* by him [Mr. Dana] in Crustacea, Cephalization consists in 'the transfer of the anterior members of the thorax to the cephalic series,' (*Sill. Journ.* Vol. XXXVI. p. 66,) or in other words in *legs* being converted into head organs."

The passage here quoted from Prof. Dana is from an Article which was published in Jan. 1863, ten months before the first of the series of four Articles on Cephalization, of which the one now under view forms the fourth, and asserts expressly that "the transfer of the anterior members of the thorax to the cephalic series is *the foundation of rank* among the Orders of Crustaceans." (p. 66.) Now, in saying that "as originally expounded by him [Mr. Dana] in Crustacea, Cephalization consists" in such a transfer, I frankly confess that I was guilty of two errors, 1st. in quoting from a Paper published in 1863 as conveying Prof. Dana's "original" views on the Classification of Crustacea, for it appears that he had published on the subject as long ago as 1852 and 1856; and 2ndly, in implying that the "transfer" referred to in the Article of Jan. 1863 forms, according to his views, the only mode in which what he calls Cephalization is exhibited in Crustacea; for he mentions in that very Article one or two subordinate characters in addition in Crustacea, which he considers as forms of Cephalization. But Prof. Dana is not satisfied with proving me thus far in the wrong. He makes bad ten times worse, and causes it to appear that the passage which he quotes from my Paper refers to the views on Cephalization

propounded by him generally with regard to the whole Animal Kingdom, in his series of four Articles on Cephalization, where Cephalization is divided, subdivided and re-subdivided into *Aa, Ab, &c., Ba, Bb, &c., Ca, Cb, &c.*, like a Synoptical Table of Insects, and not to his previous exposition of those views in the particular Class of Crustacea. For on p. 163 of his Article he quotes the identical passage from my Paper, as printed above, between inverted commas, *totidem verbis*, except that he substitutes the word "propounded" for "expounded" and repeats the same substitution, likewise between inverted commas, in the succeeding paragraph, where he goes one step further and omits the qualifying words "in Crustacea." It is hardly necessary to add, that "propounding" a theory in general terms is a very different thing from "expounding" it in a particular case; just as "prosecuting" a criminal is a very different thing from "executing" him, "prohibiting" a book is a very different thing from "exhibiting" it, and "proposing" a misstatement is a very different thing from "exposing" it.

2nd. On p. 240 of my Paper I said that "At all events *IF* Coleoptera are inferior to Diptera, because their flying organs are placed further back from the head, Diptera must be superior to Hymenoptera, because the Dipterous wing is placed one half-segment nearer to the head, than the central point common to the front and hind wing in Hymenoptera."

Prof. Dana misquotes this statement, and makes me assert a thing to be true, which the veriest tyro in Entomology knows to be untrue, in the following passage:—"Our objector" [i. e. Benj. D. Walsh] "says that the position of the wings in the Dipters is half a segment nearer the head than that of the anterior pair in the Hymenopters, and that therefore the Dipters ought to stand first in the system." (p. 168.) In the first place I never said that, unconditionally and absolutely, "the Dipters ought to stand first in the system." The little word "*IF*," in my sentence as quoted above, cuts away that ground from under the Professor's feet. And in the second place, what kind of a process is this, to substitute the words "anterior pair [of wings] in the Hymenopters" for my words "the central point common to the front and hind wing in Hymenoptera?" Of course, having put a false and absurd statement into my mouth, the Professor finds no difficulty in refuting it. And in the same manner it would be easy to refute any author that ever wrote, or ever will write, in this world. The prescription is brief, easy and infallible. First misquote your antagonist's language, so as to make him talk stark staring nonsense, and then with

great pomp and ceremony refute the nonsense, that you have yourself put into the mouth of the miserable man. *Probatum est*, J. D. D.

3rd. On p. 242 of my Paper I wrote *verbatim*—asterisks and all, except the three words inclosed in brackets [ ]—as follows:—"‘Hymenoptera,’ we are told [by Prof. Dana] ‘are the most uniform in shape or size of Apipens. \* \* Among them there are no imitations of the forms in other tribes, while they are extensively copied after—a characteristic peculiar to a type of the very highest grade.’ (p. 15.) Surely Aphaniptera (the fleas) are far more uniform in shape and size than Hymenoptera, which run from two inches long to an almost microscopic minuteness."

Prof. Dana, on p. 170 of his Paper, says that "our objector" [i. e. Benj. D. Walsh] "remarks that the Fleas are far more uniform in shape and size than the Hymenopters, and therefore, according to the criterion mentioned, ought to be placed first among the Apipens; apparently unaware that in this bit of logic the criterion referred to is made *superior* to all others, or the most decisive of grade, and not perceiving, therefore, that the *reductio ad absurdum*, intended for the principle criticized, attaches to the critic himself." Now what are the facts? The words "*and therefore, according to the criterion mentioned, ought to be placed first among the Apipens*" in Prof. Dana's sentence, which are put by him into my mouth, and which he takes for the text of a long lecture, fulminated against myself, on the importance of attending to the principles of Natural Classification, are positively "manufactured out of whole cloth" by Prof. James D. Dana, of New Haven, Connecticut; and nothing whatever in the least similar to them is to be found in the passage from which the Professor professes to quote, or anywhere else in my Article, or in any other Article that I ever wrote. In reality that passage is—as any one may see by referring to the context—nothing but the second in number out of nine "erroneous statements" \*in Entomology, into which I show that Prof. Dana, "as might be naturally expected from the fact that Entomology is not his speciality," has inadvertently fallen. Far from deserving the Professor's lecture in advocacy of Natural Classification, I have nowhere breathed a syllable in favor of any Artificial system of Classification, and I have expressly on p. 236 of my Paper found fault with him for flying in the face of the very views which he now upholds, but of which he seems to have been sadly oblivious, when he "based" his

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\* See Appendix at the end of this Paper.

new Classification of Animals, as the very title of his three first Articles on the subject proves, on the single character of "Cephalization;" thus showing that it was in reality, not a Natural, but an Artificial System.\*

I might bring forward other cases of misquotation on the part of Prof. Dana, equally conspicuous and equally indefensible with the above. But I will stop with the *third*, as the Professor delights in the frequent recurrence of the mysterious number *three*. (p. 174.) I may as well, however, take this opportunity to rectify a few passages in that Paper of mine which Prof. Dana has criticised.

1st. The genus of Spiders, described in the note on p. 235 and provisionally named *Myrmecarachna*, is, as Baron Osten Sacken has kindly informed me, identical with *Synemosyna*, Hentz.

2nd. On p. 249 I failed to call to mind any larva that spins from the anus like a spider. That of *Chrysopa* does so, as we learn from Fitch, (*N. Y. Rep.* I. p. 79,) and Shimer, (*Proc. etc.*, IV. p. 210.)

3rd. On p. 249, line 8 from bottom, for "Brachygaster" read "Microgaster." I quoted this example from memory, and I am not quite sure that I did not mistake the anus for the head, the observation having been made in the field and with the naked eye.

ROCK ISLAND, ILLINOIS, May 14, 1866.

#### APPENDIX. (See above, page 118.)

Many more such "erroneous statements" might be added from the Paper now under view, as, for instance the assertion that "the anterior wings in the Hemiptera, as in the Coleoptera and Orthoptera, are not flying wings." (p. 172.) If the Professor will only open his eyes the next time he walks out into the fields, he will see that almost all our common Grasshoppers use their front wings in flying as well as their hind ones. I have often watched the male of our common *Edipoda carolina* Linn., hovering in the air, like the European kestrel or our sparrowhawk, and striking rapidly with all four wings at once. If it were not that Prof. Dana has expressed his contempt for "ordinary systematists," (p. 167) I might refer him also to Westwood, who says, speaking generally of the Orthoptera, "During flight both

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\* "The Classification of Animals based on the principle of Cephalization; by Jas. D. Dana." *Amer. Journ. Sc. and Arts.* No. I, Nov. 1863. No. II, Jan. 1864. No. III, March 1864. It is a significant fact, that in No. IV of this series, (the Paper we now have under consideration,) the title is changed to "On Cephalization; No. IV. Explanations drawn out by the statements of an objector; by Jas. D. Dana."

pairs of wings assist in locomotion." (*Introd.* I. p. 12.) It is true there are a few exceptions to the general rule, one of which is the very anomalous *Forficula* family, which, although it differs so widely from all other Orthoptera, that most British and some Continental authors place it in an Order by itself, Dana has united with the *Blatta* family in a group of equal value with that very natural one composed of the Crickets, Catydids and Grasshoppers; and another is the genus *Tetrix* among the Grasshoppers, which has mere abbreviated scales in the place of front wings. No experienced Entomologist, however, needs to be told, that there is scarcely a single rule in the science without its exceptions. In Coleoptera, it is true, the elytra are not, so far as is known, used at all in flight, and some of them, e. g. *Cetonia* and its allies, do not even lift their elytra off their backs when they fly, as was observed long ago. But although this is true of Coleoptera, it is, with a very few exceptions, positively untrue of Orthoptera. in spite of Prof. Dana's *dictum ex cathedra*, "the anterior wings in the \* \* Orthopters are not flying wings."

Hence, even according to the interpretation now put forth by Prof. Dana of his term "Elytrophers," viz: that, before we can determine the relative grade of two Orders of Insects, we must see them actually fly and see how far "the posterior wings are the main flying wings," and not be guided by such "mere external characteristics, of no dynamical value," as "the fact of the fore-wings being coriaceous wholly, in part, or not at all," which fact is dogmatically asserted to have "no bearing whatever on the question" (p. 167,) —even, I say, according to this interpretation of Prof. Dana's term "Elytrophers," under which he classifies, 1st. Coleoptera, 2nd Heteroptera, 3rd Orthoptera, the Orthoptera must be, as I originally asserted, (p. 241) superior on his own principles to the Coleoptera, instead of *vice versa* as asserted by him. For in Orthoptera the front wings are generally used in flight, in Coleoptera they are not; and consequently in the former the hind wings are less exclusively "the main flying wings" than they are in the latter. In fact Prof. Dana seems to have had a latent consciousness of this himself; for he entirely evades in the passage just now referred to the question of the relative superiority of Coleoptera and Orthoptera, and flies off at a tangent to the question of the relative superiority of his "Prosthenics" and "Metasthenics."

If we compare the front wings of even those Orthoptera where they are the most thickened and coriaceous, e. g. *Blatta*, *Acheta* or

*Platyphyllum*, with the elytra of those Coleoptera where, instead of being corneous as usual, they are coriaceous, e. g. *Lytta*, *Photinus* or *Telephorus*, we shall always find in the former, with the single exception of *Forficula*, a regular system of numerous, large, branching, reticulate wing-veins, plainly visible to the naked eye on both surfaces, as in other Orthoptera; while in the latter there is no such system, but only, as in other Coleoptera, two or three simple longitudinal veins at the most, which are often traceable on the lower surface alone. The reason is obvious. Where, as in almost all Orthoptera, the front wing is a flying organ, the structure of the wing-veins is elaborated, so that besides their normal function as veins they perform the additional function of the bones in the wing of a Bat. In *Forficula* on the contrary (*F. auricularia* of Europe), where the representatives of the anterior wings are as truly elytra or mere wing-cases as they are in Coleoptera, they are of a uniform, semi-transparent, coriaceous substance with two or three straight, simple veins only, as in Coleoptera; which no doubt was one reason why Linnæus referred this genus to Coleoptera. Even in Heteroptera, we find in the coriaceous basal part of the wing a similar system of branching veins, connecting with those in the membranous terminal part; which indicates that here also the front wings, or "hemelytra" as they are called, are used more or less in flight as well as in Orthoptera, though from the generally small size of these insects I do not know that the fact has been proved by actual observation. Certainly, from the analogy of *Forficula*, we may infer that they are so used. For in *Forficula* that portion of the *hind* wing, which when the wings are folded up is unprotected by the elytrum, is coriaceous; just as in Heteroptera that portion of the *front* wing, which when the wings are folded up is unprotected by the overlapping portion of the other front wing, is coriaceous. Yet *Forficula*, as it is known to fly vigorously by night, must necessarily fly with its partially coriaceous *hind* wings; for its elytra are altogether too small for the purposes of flight. Consequently we may infer, that Heteroptera also use their partially coriaceous *front* wings more or less in flight.

## COLORADIAN BUTTERFLIES.

BY TRYON REAKIRT.

In the following short treatise, I have endeavored to bring together all the Diurnal species of whose authenticity of habitat—around the spurs, and on the slopes of the Rocky Mountains—I have been assured.

A very large proportion of these, I have in my own collection, for a number of which I am indebted to our energetic collector, Mr. James Ridings, who spent the spring and summer of 1864, in Colorado Territory, and who has also kindly furnished me with interesting notes upon the habits of many species; some few I have been obliged to extract from Entomological works, or published catalogues of Museums, and others belonging to the Entomological Society, and Wm. H. Edwards, Esq., I have incorporated into the list, to render the memoir as far as possible, complete: several which we would naturally look for in this locality, as *Eriippus*, *Cardui*, &c., I have been obliged to omit, from lack of data, upon which to correctly chronicle their occurrence—but without doubt, a host of old and new species, would be added by a thorough exploration of the Mountains and their valleys.

The species generally, in common with those of California (sections of the same latitude) are characteristic of, and replace, many more Southern types, but a few (*Smintheus*, *Chryxus*, &c.,) occur, whose analogues are chiefly to be found in the extreme North, or elsewhere in the alpine, or subalpine regions of elevated mountains.

The faunistic relation existing between the Butterflies of this great "Backbone" of our country, and those of the West Coast is most intimate; when they are not interchanged, representative forms and variations, may be discovered in each, of the other: to our Eastern Lepidoptera, their affinities are more distant; the Great Desert interposes a very effectual bar to the transmission of species, and there are but comparatively few, whose powers of flight have been strong enough to carry them over this barrier.

The species here enumerated, furnish the following data with reference to their distribution over several distinct zoological districts:

Total number of species.....	72
Common to the Rocky Mountains and California.....	23
“ “ “ Eastern States.....	21
“ “ “ Mexico.....	5
“ “ “ California and Mexico.....	3
“ “ “ Europe.....	*3
“ “ “ Eastern States,	
“ “ “ Mexico and Europe.....	1
“ first three districts... ..	4
“ first four districts.....	1
Peculiar to the Rocky Mountains .....	26

The localities of each, have been indicated after its specific name.

***Papilio Asterius*, Cramer.**

Hab.—(Western)—Rocky Mts. Colorado Territory. (In my Collection).

Two specimens, collected in the heart of the mountains, appear to differ in no respect from more eastern examples. Mr. Ridg reports them as quite abundant.

***Papilio Indra*, nov. sp.**

Hab.—Pike's Peak, Colorado Terr., (Coll. Ent. Soc. Phil.).

**Male.** Upper surface, deep blackish brown; expanse 2.88–3.06 inches. Two macular yellow bands on both wings, one below the cell, and the other submarginal, very near to *Asterius*. On the anterior wings, those of the outer row are not so much rounded as in that species, but flattened lunes; while the triangulation in the inner row is not so marked, the spots nearest the inner margin, losing this characteristic almost entirely: in the second from the costa of these, there is a small rounded black dot; a narrow yellow line indicates the discal arc: fringe black.

Posterior wings, have the spots of the mesial band more closely united, and *no* detached yellow mark within the cell, as in *Asterius*; the submarginal lunules are also narrower than in that species; a series of imperfect crescents of shining blue atoms, extends from the costa to the anal margin between the two bands, the last, alone well defined, surmounts a large, bright, rufous, anal spot, containing a large black point, and situated upon the anal indentation; emarginations, yellow; the tail of *Asterius* is represented by a short, obtused prolongation, about a line in length.

Under surface, the yellow spots upon the primaries remain the same color, but are much enlarged, forming two continuous bands, divided

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\* The existence of two of these in America is very hypothetical.



only by the veins; a small yellow spot within the discoidal cell, at three-fourths its length from the base.

Upon the secondaries the continuity of the inner band is preserved, while the sub-marginal lunules remain widely separated although considerably increased in size; the outer of these and the anal ocellus are rufous, the latter with a black spot as above; the lower ends of the fourth and fifth spots of the mesial band are sometimes tinged with the same color; lunulate blue atoms between the two bands as above.

Antennæ and body, black; thorax with a dirty yellowish brown line above the wings, upon each side, terminating in a fulvous point below the head; a lateral yellow spot upon the abdomen, near the anus.

I cannot reconcile this beautiful species, with Dr. Boisduval's description of *Pap. Aristor*, Godt., to which, however, with *Asterius*, it must be closely allied. It has neither "a black tail of medium length, slightly spatulate," nor upon the under side of the secondaries, interior to the blue crescents, "a transverse, bent row of five spots, of which the three superior are yellow, and punctiform; the two inferior, fulvous, lunulate and larger."

In this species, as in *Asterius*, there are seven spots composing the inner band of the secondaries, although differing from that in other respects stated above.

It is impossible to suppose that this can be the variety of *Asterius*, referred to upon p. 38. Cat. Lep. Brit. Mus. pt. I.

***Papilio Daunus*, Boisd.**

Boisd, Sp. Gen. I. p. 342, n. 182. (1836.)

Ridings, Proc. Ent. Society, I. p. 278, f. 2. (1862.)

*Hab.*—Colorado Territory. (Coll. Ent. Soc. and Tryon Reakirt.)  
Mexico, (Coll. Boisd, and Brit. Mus.)

Two of the specimens, I possess, differ somewhat from the figure in the Proc. of the Society, in that the second transverse bar of the primaries, has an extension of black atoms to the first median nervule; in another, the fore wings are strongly falcate.

Mr. Ridings took these in June, upon the mountains only; he considers them, rather scarce, and in common with all the montane species, of difficult capture, from the impossibility of ascending the sides of the canons in which they are most generally found.

Flight, high, and very similar to that of *Turnus*.

***Papilio Turnus*, Linne.**

*Hab.*—(Western)—Pike's Peak, Colorado Territory, (Coll. Ent. Soc. and Tryon Reakirt.)

In addition to the normal form, of very common occurrence, there is a somewhat rarer variety, apparently intermediate between this type and *Rutulus*, and of which, I give a short diagnosis.

The fore wings differ from *Turnus*, in the formation of the yellow sub-marginal spots, contained in the black border,—in that they are larger, nearly all of equal size, and oblong; the black bands are also much narrower.

The hind wings, in the obsolescence of the black, discal arc, although this is hardly distinctive, since it is sometimes wanting in types of the species; and in the presence of *two* tails, both exceedingly slender, the outer but slightly spatulate, the inner acute, about one-third the length of the exterior.

Below, the yellow sub-marginal spots of the primaries are almost coalescent, and the black border of the secondaries, is much more uniformly and thoroughly covered with shining blue atoms, than is usual in types of the species. The yellowish underpart of the body is also changed to a cinereous brown.

This interesting variety is very much more delicate in structure, than any of a very great number of the typical form, with which I have compared it; I have seen but two specimens.

***Papilio Rutulus*, Boisd.**

Morris, Synopsis, p. 3, n. 3. (1862.)

*Hab.*—Pike's Peak, Colorado Terr., Cala., (Coll. Tryon Reakirt.)

Pike's Peak, (Coll. Ent. Soc. Phil.)

This seems to be more common in the mountains than either *Daunus* or *Turnus*. As there is really but very slight differences between all three—it must probably have been mistaken for either of these two—especially the latter, since I can find no previous record of its occurrence there.

The chief points of distinction amount to these:—between *Daunus* and *Turnus*, the narrowness of the black bands upon the former as compared with those of *Turnus* (not always, however, persistent in the last); a continuous sub-marginal ray on the under side of the primaries, instead of a row of oblong spots, and the presence of three tails in the former, in place of one, or sometimes two, as we have just seen, in the latter;—*Rutulus* agrees with *Daunus* in having the continuous sub-marginal ray, whose width, however is usually much less in the former; differs in having but one tail, and in the greater breadth of the transverse, black bands:—*Turnus* agrees with *Rutulus* in the width of the transverse bands; differs sometimes in the number of tails, and always in the sub-marginal line, this in *Turnus* being composed of distinct

spots :—the antennæ of *Damnus* and *Rutulus* appear to be more clavate than those of *Turnus*.

There are several other minor differences, such as the length of the antennæ; and shape and color of the lunulæ, &c., but the three species can always be readily separated by the above given special characteristics.

In Morris' Synopsis, under the description of this species, he quotes Dr. Boisduval, that it (*Rutulus*) has not "the sagittate spots between the border and discoidal cellule of *P. Turnus*." This is not always correct, as I have a specimen from California, in which these are very prominent—the same insect having the anterior wings somewhat falcate.

I was surprised to find this species indigenous to the Rocky Mountains; my previous knowledge of the species had always led me to consider it as strictly from the west coast.

It is very probable that both *Damnus* and *Rutulus* are local and completely segregated forms of *Turnus* having arisen from some of the many varieties which widely disseminated species almost always present, although the form of divergence is in opposite directions; should *Eurymedon* be a variety of *Rutulus*, (of which, more anon) as supposed by Dr. Gray, it would afford a further and successive grade beyond the last of these related species.

Extra-tropical North America thus furnishes, upon a much greater field of distribution, an interesting example of a polymorphic species, analogous to *C. Lycaste*, of northern—or to *M. Polymnia* of central South America.

Here however the proof of entire segregation, and consequently complete formation of species, is more perfect than in either of these, since in one locality, there are three, and in another, two of these sister races, co-existent without amalgamation.

In the Rocky Mountains, we have *Damnus*, *Turnus*, and *Rutulus*; in California *Rutulus* and *Eurymedon*.

**Papilio Eurymedon**, Boisd.

*Pap. Rutulus*, var; G. R. Gray.

*Hab.*—Pike's Peak, Colorado Territory. (Coll. Ent. Soc. Phil.)

California, Washington Territory. (Coll. Tryon Reakirt.)

This I believe to be the furthest extension of the series of segregated forms, of which *Fap. Turnus* is the nucleus. The differences between it and *Rutulus* are too constant, to admit of its being a local

form of the latter; no intermediate variety, to my knowledge, connects the two, and I think it much more likely that the species are both of equal value, and derived from *Turnus*.

Dr. Behr, I am informed, considers it as a *female* form of *Rutulus*, the relation being similar to that existing between *Turnus* and *Glaucus*.

This hypothesis is instantly controverted by the fact that six specimens I have before me are all *male*—in fact, I have never seen a ♀, although there is an example in the Coll. Ent. Society which might possibly be of this sex, but the abdomen is so much mutilated, that I am unable to determine with certainty, which; in coloration, it differs only in the lunules of the hind wings being more fulvous.

The indisputable fact that the *males* of this species are unlike those of *Rutulus*, is a very strong argument that it is not a mere variety, nor one likely to become merged again into the parent form, and especially against its being an abnormal *female* condition: the operations of natural selection being specially operative with the latter.\*

*Papilio Pilumnus*, Boisd.

*Hab.*—Rocky Mountains. (Coll. W. H. Edwards.)

Mr. Edwards informs me that he has this species from the above locality—most probable from the New Mexican sierras—it is also found in Texas and Mexico.

*Parnassius Smintheus*, Doubleday.

Diurnal Lepidoptera, I. p. 27, n. 8, pt. IV.\* f. 4. (1847.)

Edwards, Proc. Acad. Nat. Sciences, p. 225. (1862.)

♀. *Parn. Sayii*, Edwards, Proc. Ent. Soc. II. p. 78. (1863.)

*Hab.*—Pike's Peak, Rocky Mts., Colorado Terr. (Coll. Ent. Soc. and Tryon Reakirt.)

"California," (Edwards.)

Very variable:—In over thirty specimens examined, I have found eight, very closely allied, but perfectly distinct, and seemingly constant forms. Assuming the figure in the "Genera" to correctly represent the normal type of the male, with which Mr. Edwards description does not exactly agree, and correspondingly colored with which I have also been unable to find any examples—we have the following series of variations, the divergences principally existing upon the upper surface.

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\* Mr. P. R. Uhler, writes me that specimens of the *female* in the Museum of Comp. Zoology, differ but very slightly from the *male*, either in color or ornamentation.

*Var. a*, and which I consider the true *male* type, the other forms being in process of segregation, presents a distinct sub-quadrate black spot (noticed in Mr. Edward's description) about .11 inch in width, in the medio-posterior interspace of the fore wings upper surface, touching neither vein nor veinlet, and opposite the middle of the inner margin.

No distinct internal prolongation of black atoms, at the end of the abdominal band, as delineated in Doubleday's figure; the under side agrees with Mr. Edward's diagnosis.

*Var. b*, has the red costal spot small, and but a minute crimson dot within the interior black spot; sub-interno-marginal patch, small, about .04 inch in width; secondaries furnished with a distinct, sub-marginal row of six rounded, black dots, and both surfaces, the lower similar to the upper in all respects, thickly strewn with black atoms; I have seen two, of this form, the only ones in which I have observed this peculiarity.

*Var. c*. Crimson obsolete in the interior spot of the fore wings, and but two sub-marginal spots visible upon the secondaries, but these are very much larger than in the preceding. Under surface as in *var. b*, but deprived of the sprinkled black atoms.

*Var. d*. Outer margin as heavily marked as in the *female*; crimson centre almost obsolete in costal; and entirely so in the interior spot; two small spots in the medio-posterior area,—the outer, corresponding in situation with that found in the preceding forms, the inner midway between this and the base; discal arc, and submarginal spots (six of these) of hind wings very heavily marked, the latter becoming lunulate; a very large black patch near the anal margin, corresponding with the red mark below.

*Var. e*., is similar to the above, but the dark outlines are very pale, and the crimson on both surface, is lightened to pale pink; the inner sub-interno-marginal spot of the primaries is also wanting.

*Var. f*., has the costal and the interior spots, distinct—disconnected;—in all the others these are joined by a black bar of greater or less width; this also, with the following, is deprived of the black spot near the inner margin of the primaries—the only two agreeing in this respect, with the engraving in the "Genera;" the sub-marginal spots of both fore, and hind wings are very indistinct.

*Var. g*., agrees generally with the former, but with the total obsolescence of all submarginal spots. On the under side we find the black interno-marginal spot of the primaries, wanting upon the upper

surface, but there it is deprived of the oblong crimson anal patch.

*Var. h.*, similar to *var. b* in outline, but deprived of the black atoms, and the upper surface is bi-colored only, the crimson or pink ocellations being replaced by pure white; below, the pinkish tinge is scarcely perceptible; the interno-marginal patch is also very large, .14 inch in width, and infringes upon the sub-median nervure.

Of all these varieties, I have seen more than three specimens of each, excepting *var. b*,—in that case only two,—of *var. a*, I have before me, nine examples, all exactly agreeing with its diagnosis—and although some of them, separately might seem of specific value, arranged in a continuous series, their close, and inseparable relationship is unmistakable.

I think it highly probable that both *Smintheus* and *Nomion* are derivatives from the same parent stem, the former being yet in process of segregation, while the latter—most probably the older form—has passed through its transitional stages, and now presents only constant specific diagnostics. The chain of closely linked varieties of *Smintheus*, of which the highest (a ♀ form yet to be noticed) approximates to *Nomion*, would seem to corroborate this supposition.

*Parn. Clorius*, of California offers some little resemblance to some of the *male* varieties, but not sufficient to consider that it has sprung from the same root, nor more than is usual between the species of this genus.

The *female* does not seem to be so variable as the opposite sex, although from the much fewer specimens examined, this, I am unable to assert definitely. I have never come across any of the form described by Mr. W. H. Edwards in the Proc. Acad. Nat. Sciences; all which I have seen, were of the type of his *Parn. Sayii*, (*Smintheus* ♀) more or less intensified.

As described by Mr. Edwards, and I have corroborated my views by careful examination and comparison with the original specimen, it is but a link between certain varieties of the *male*, and a heightened form of the *female*, closely resembling *Nomion*.

The "three white spots running from the costa, each surrounded by black," are simply dilations of the costal spots, and connecting bar of the *male*. The deprivation of scarlet upon the fore wings, is by no means distinctive, since we find a corresponding example in *var. h*, of the *male*, in which, too, the ocellate spots of the hind wings under side, are very pale centred, the pink, much lighter in shade than in *Sayii* (*Smintheus* ♀). The black patch on the inner margin is but en-

larged, as is usual in this sex,—although but little more than in *var. h*, and the blackish bar running thence to the three contiguous spots, is represented on several of the *male* forms by indistinct traces, and in *var. b*, is replaced by a whole surface of black atoms. The pink spots of the secondaries find their analogues in *var's. a, d, e, f*, and *h*; *var's. a*, and *d*, having this ocellation very prominent; *var. f*, in a less degree, and in the two last, the coloration is of a uniform pale tint, so that but two out of the eight aberrant *male* forms, present purely crimson spots: we find the rudiments of "a sub-marginal row of black lunules," and the "two small connected black spots" on the abdominal margin in the *var's. b, g*, and *e*. In short, I cannot find a so-called specific character in *Sayii* (*Smintheus* ♀) which is not also represented in the *male* of this species, either incipiently, or well-marked, and viewing it in connection with a long series of *Smintheus* ♂, I cannot do otherwise than regard it as the most normal form of the *female* that has fallen under my observation.

*Var. a—female*—is a really much more extraordinary aberration, differing from *Sayii* (*Smintheus* ♀) in the substitution of brilliant crimson, for all white or pink spots; we have thus three large contiguous spots running from the costa, and a large patch near the inner border of the anterior wings; a large costal and a discal patch, the latter enclosing a white dash, and three small contiguous spots, (the central, the largest and sub-triangular,) forming a connecting line from the discal patch to the anal angle, upon the posterior wings; all of a pure bright crimson, encircled with black. On the under surface, these are all reproduced, faintly upon the fore, vividly upon the hind wings, on which they are also all very largely pupilled with white.\*

The shape of the pink or crimson spots varies through the following degrees,—the variation not being confined to either sex—round, oval obovate, sub-triangular, triangular, and sub-quadrate, and often times a similarly situated and formed spot, has its position reversed in different individuals—running transversely, or in an opposite direction. The only apparently constant diagnostic, which I have detected in this species, is the *seemingly* regular situation and form of the four basal spots on the under surface of the secondaries: in these, it differs from

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\* Since I wrote the diagnosis of *Smintheus* ♀ *var. a*, I have received a specimen from Virginia City, Montana Territory, where it was taken in copula with a *male* of the form *var. a*, so that there can be no doubt of its proper position. or that I could, by a strange possibility, have mistaken a *female* of *Nomion*, for one of *Smintheus*.

all the species, marked with a similar macular row, which it has been my fortune to examine, and very strongly so from *Nomion*, the only species so far as I know, which closely approximates certain forms of the *male* and *female*.

Mr. Ridings captured this fine species in July, solely within the mountain districts; usually when settled upon the flowers of some tree, and *always* near the edge of a water course. It is abundant, but of difficult capture, not only from the natural obstacles interposed, but also from its very quick and high flight, this commonly ranging from four to eight yards above the head.

***Parnassius Nomion*, Fischer.**

*Hab.*—"Rocky Mountains," (Boisduval.)

Dr. Boisduval states—Ann. Soc. Ent. 2d ser, x. p. 282, that *Nomion*, in conjunction with *Smintheus*, is found in the Rocky Mountains. I think he must have had in view one of the forms of the preceding species, perhaps *var. a*—female.

***Pieris Oleracea*, Harris, sp.**

Scudder, Proc. Boston Soc. Nat. History, VIII. p. 178. (1861.)

*Hab.*—(Western). Empire City, Colorado Territory; Virginia City, Montana Territory, (Coll. Tryon Reakirt.)

Pike's Peak, Colorado Territory, (Coll. Ent. Soc. Phil.)

The examples from Empire City have all, with one exception, the apex considerably tipped with black; the black costal line, and basal atoms are also strongly marked. Three, out of five specimens before me, have on the under side, the costal, sub-costal, and median nervures of the secondaries, bordered with grayish scales as far as the extremity of the cell only; in these the under surface of the secondaries, and the apex of the the primaries are distinctly yellowish green. In the other two, the ground color is nearly white, and in these the nervules on the under side of both primaries and secondaries, are heavily bordered with darker scales; they also present a slender line of grayish scales, crossing the cell longitudinally.

A single specimen from Montana has the base strongly strewn with black, and a narrow black line at the apex. Underneath, the exterior nervules of the primaries, and nearly all of the secondaries are broadly bordered with dark greenish-gray scales. The exception upon the hind wings is in the lower disco-cellular vein, which is immaculate.

Mr. Ridings informs me that in Colorado, he captured it only at Empire City, nor did he see it anywhere else on his route. I had it



previously however, and have received it since from other localities in the same region.

At Empire City it was rather common in August, settling on flowers by the edge of, or near streams. Flight similar to that of *Protodice*, but quicker.

I have only given the extreme western localities above. Mr. S. H. Scudder very fully designates its eastern area of distribution as follows:—

“It is found inhabiting the northern and eastern portions of N. A., reaching south but rarely as far as Pennsylvania, and extending to the east to Nova Scotia, west to Lake Superior, while to the north it is found up to Great Slave Lake in the Hudson's Bay Company's Territory, and even, according to Kirby, to lat. 65° N. on McKenzie's River.

*Pieris Vernalis*, Edwards.

Edwards, Proc. Ent. Soc. II. p. 501. (1864.)

*Hab.*—Empire City, Colorado Terr. Schooley's Mt., N. J., (Coll. Tryon Reakirt.)

Kanawha, Philadelphia, (Coll. Wm. H. Edwards.)

Pike's Peak, Colorado Terr., (Coll. Ent. Soc. Phil.)

“Red Bank, N. J., (Coll. Messrs. Newman and Wilt.)”—Edwards.

My *male* specimens differ slightly from Mr. Edwards' description, in that the secondaries are not so heavily marked as his diagnosis would lead us to infer, and the *females* are very much more so. I have one of the latter, in which the secondaries have, on the upper side, a very distinct sub-marginal serrate band of brownish-black scales, the points extending to the margin, and united to the marginal line, and another, in which they are immaculate, save a narrow marginal line. In both, there is a series of marginal points, and a sub-marginal band on the primaries, the opposite spots being connected by narrow black veins: the spots extend only to the middle of the outer margin, where they abruptly terminate. Their fore-wings also present an indistinct patch near the inner angle.

The single specimen (*male*) from Empire City, (expanse 1, 5 inches,) was captured in August, in company with *Protodice*, from which its flight is undistinguishable.

Those from Schooley's Mountain (expanse 1.67–1.88 inches,) were taken in the early part of June.

*Pieris Protodice*, Boisd.

Scudder, Proc. Boston Soc. Nat. History. VIII, p. 180. (1861.)

*Hab.*—(Western)—Rocky Mountains, Colorado Territory, (Coll. Tryon Reakirt.)

“California,” (Edwards.)

For the more eastern geographical distribution of this species, I shall again quote Mr. S. H. Scudder :—

“This butterfly also enjoys a wide geographical range, extending from Texas on the South-west, Missouri on the West, and the mouth of the Red River of the North on the north-west, as far as Connecticut, and the Southern Atlantic States on the East.

I have but two specimens (♂ and ♀) from Colorado, although the insect is quite common in July and August. The *male* is very lightly marked, but not less than individuals I have captured at Trenton, N. J. The *female* agrees with Mr. Edwards description of *P. Nusturtii*, Boisd., with the absence of “a faint coppery tinge” upon the black spots, but it is not sufficiently at variance with our eastern varieties, for me to separate it as that species.

Taken in July and August.

*Pieris Occidentalis*, nov. sp.

*Hab.*—Rocky Mountains, Colorado Territory; California, (Coll. Tryon Reakirt.)

*Male*. Upper surface, white, base powdered with violaceous-grayish atoms: a marginal row of isoscelate-triangular griseous spots on the primaries, within these an interrupted, deep, black, maculate band, running from the costal to the inner margin: a short transverse bar upon the arc, cut by a narrow white ray.

Outer margin of secondaries furnished with a connected row of sagittate marks, having a super-imposed deep black spot near the outer angle: in some specimens, however, the hind wings are nearly immaculate.

Under surface, white; the apex of the primaries, and the whole of the secondaries, tinged with yellow: the markings of the upper surface, repeated indistinctly below; a large black spot near the inner angle of the primaries.

Secondaries,—veins broadly bordered with bright yellow or greenish-yellow atoms; a submarginal serrate band as on the upper surface, sometimes almost obsolete; no distinct discal bar as in the allied species: expanse 1.75–2.00 inches.

*Female*, differs in being much darker; grayish triangles of primaries

tinged with black towards their apices: grayish portions of secondaries tinged with violaceous, which also covers all the abdominal area, below the cell; two or more sub-marginal jet black spots near the outer angle.

Below, the veins of the secondaries are much more dilated and greenish—the sub-marginal band, very prominent—giving the appearance of two concentric curved macular rows, and a central cellular elongate spot, all white, upon a dark-greenish ground: expanse 1.88 inches.

**Pieris Menapia**, Felder.

Felder, Weiner Entom. Monatschrift, III, p. 27. (1859.)

*Hab.*—Utah, (Coll. Felder.)

I have never seen this species, nor am I aware of its being contained in the cabinet of any American Entomologist.

**Pieris Callidice**, Godt.

*Hab.*—Rocky Mountains? (Coll. Brit. Mus.)

I do not believe in this locality, or that it can be considered an American species. Apart from the very great difference of geographical distribution, out of perhaps the largest collections of Rocky Mountain Lepidoptera ever formed, (those belonging to the Entom. Society, W. H. Edwards, Esq., and myself,) I have failed to detect any species, which might, even by careless examination, be construed into this. Its nearest American congener is *P. OCCIDENTALIS*, m; but I have proved most satisfactorily by a comparison of specimens, and as will also be readily perceived by the foregoing description, that they are specifically distinct.

**Nathalis Iole**, Boisd.

Boisd., sp. Gén. I, p. 589, n. 1. (1836.)

*N. Felicia*, Poey. Mem. I, p. 443, n. 14, t. 18. (1851.)

*N. Var. Irene*, Fitch, 3d Report, Suppl. p. 167, n. 212. (1859.)

*Hab.*—Rocky Mts., Colorado Terr., Cuba, Honduras, (Coll. Tryon Reakirt.)

Rocky Mountains, (Coll. Ent. Soc. Phil.)

Illinois, Texas, (Coll. W. H. Edwards.)

Illinois, Mexico, (Coll. Brit. Mus.)

"Jamaica," (E. Doubleday.)

"Texas," (Rev. J. G. Morris.)

I am unable to discover any specific differences between Poey's *Felicia*, of which I have examined his original examples, and those found within the United States; I have therefore treated it as a

synonym. *Irene*, also, as stated by Mr. Edwards, appears to be only a variety, although more plentiful, and more widely distributed than the tropical form.

The *female* has never, I believe, been either figured or described, I consequently subjoin a short diagnosis.

Upper surface: fore wings similar to the *male*: hind wings more or less diluted with orange; abdominal margin and base greenish; a large black patch on the outer angle, a narrow serrated terminal band from which short black veins arise; a transverse fascia of faint brownish atoms, extends from the inner side of the black patch to the middle of the abdominal margin.

Upper side: basal portion of fore wings suffused with orange, their apex, sprinkled with grayish olive-green atoms.

Secondaries, olive green thickly strewn with grayish particles, a paler central transverse bar, becoming obsolete towards the abdominal margin, and a lightly colored terminal border; within the cell there is a small pale yellowish-gray spot.

***Anthocharis Ansonides*. Boisd.**

Lucas, Guér. Revue et Mag. Zool. p. 340. (1852.)

Edwards, Proc. Ent. Soc. Phil. II, p. 81. (1863.)

*Hab.*—Rocky Mountains, Colorado Territory, California. (Coll. Tryon Reakirt.)

California; Youcon River, Russian America. (Coll. William H. Edwards.)

This appears to be very rare, and has been taken only in the neighborhood of Pike's Peak.

***Anthocharis creusa*. Doubled.**

Diurnal Lepidoptera, I. p. 56, n. 6, t. 7, f. 1. (1847.)

*Hab.*—"Rocky Mountains, North America." ex Genera.

I am unacquainted with this species; its upper surface is very near the preceding and they may possibly be identical.

***Colias Philodice*. Godart.**

Presents about the same shades of variations, as in the East; but one, a ♀, offering any peculiarity worthy of notice: in this, the disc of the secondaries is suffused with blackish atoms, and beyond a sulphur-yellow terminal band, is marked with a broad black border, half the length of the outer margin.

*Hab.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

***Colias Alexandra*. Edwards.**

*Hab.*—Empire City, Colorado Territory, (Coll. Tryon Reakirt.)

Mr. Ridings informs me that this is common in the mountains, from the beginning of July to the middle of August, having taken it all the way from Golden Gate to Empire City: he observed that its flight was straight forward, and not so much in starts as in the allied species, settling but seldom.

From the examination of a large number of specimens, I should not be at all surprised if the ♀ var. described by Mr. Edwards, should prove to be the normal form, as I have not only found them to be the most abundant, but also as in that case, it would be pursuing but the usual analogous type of coloration, in this instance peculiarly generic.

***Colias Scudderi*, Reakirt.**

*Hab.*—Empire City, Colorado Territory. (Coll. Tryon Reakirt, and Ent. Soc.)

***Colias Eurytheme*, Boisd.**

*Hab.*—Empire City, Colorado Territory; California (Coll. Tryon Reakirt).

Texas, California, Nebraska, Mississippi, (Coll. W. H. Edwards).

"Mexico, California," (Rev. J. G. Morris).

A species of wide distribution, as will be seen from the localities given, and presenting little or no variation.

Very common in August, over the plains, and through the mountains; flight very similar to *Philodice*; the wild Sunflower (*Helianthus*, sp.) is a common food plant.

On page 10, Appendix VIII, Cat. Brit. Mus. following *Callidryas Gorgophone*, is a *Colias*? from the Rocky Mountains, this may probably be referred to either *Alexandra* or *Scudderi*.

***Euptoieta Claudia*, Cramer, sp.**

*Hab.*—Rocky Mts., Colorado Territory; Schooley's Mt., N. J.; Philadelphia; Honduras. (Coll. Tryon Reakirt.)

Also a species of wide geographical distribution, nearly constant in all its area.

It is very common in the mountains, and enclosed valleys; of very quick, but not an high flight; is as partial to the *Helianthi* as the preceding, and may be taken from June till August.

***Argynnis Nokomis*, Edwards.**

*Hab.*—"Rocky Mountains, and Mountains of California." Edwards. I am unacquainted with this species.

***Argynnis Aglala*, Linné.**

Mr. Edwards in vol. ii, Proc. Ent. Soc., p. 504, remarks, "Dr. Behr

states that he has never known of *A. Aglaia* being captured in California. In the society's collection are two specimens of *Aglaia* taken by Mr. Wood in the Rocky Mountains, so that the existence of this species, upon this Continent is no longer doubtful."

The two examples, which Mr. Edwards very curiously mistook for *Aglaia*, are entirely distinct from that species, and undoubtedly new.

In size, they approach the largest specimens of *Daphnis*, and differ very decidedly from any described North American species; their diagnosis follows.

*Argynnis Edwardsi*, nov. sp.

*Hab.*—California; Pike's Peak, Colorado Territory. (Coll. Tryon Reakirt.)

Colorado Territory; Washington, D. C.? (Coll. W. H. Edwards.)

Rocky Mountains. (Coll. Ent. Soc.)

*Male.*—Upper side bright fulvous, a little dusky at the base; outer margin bordered with a narrow, black line, preceded interiorly by a heavy, parallel line, the nervules between and sometimes the whole enclosed space being black. Both wings marked and spotted with black, nearly similar to *Daphnis* and the allied species; the markings being however, very clear, distinct and slender; the submarginal lanceolated spots are nearly always connected with the marginal band, separating a series of lighter colored spots from the ground color; a small black sagittate mark in the upper part of the medio-posterior interspace, the transverse median black bar of which is always curved inwardly.

Secondaries present a series of pale, discal spots, analogous to those of *Callippe*, although less strongly marked; a mark in the lower part of the cell, resembling an S, with the lower limb so much shortened, that it is separated from the body of the letter, only by the pale vein; within the cell, and above the S, a large, isolated, rounded, black dot, always prominent in the *female*, sometimes obsolete in the *male*; fringe whitish-yellow, cut with black at the extremities of the nervules. Expanse, 2.75—3 inches.

Under side, base and inner margin of the primaries, bright red fulvous—central part of costa, pale fawn—towards the apex, greenish-buff; a submarginal row of from six to eight silver triangles, running from the costa; behind these a short parallel row of five silver spots; the first, triangular; the second, large, obovate; the third, round; the fourth and fifth, minute—these last impinging upon the upper two of the submesial series of rounded, black dots.

Secondaries, olivaceous, darkest next the base, an indistinct, in some specimens almost obsolete, sinuous pale, greenish-buff band, between the two outer rows of silver spots, and along the outer margin. Twenty-two silver spots, all but the two near the base narrowly bordered anteriorly with black, arranged thus:—seven marginal spots edged also below with black; a second row of seven spots, the first three oblong, large, the fourth, rounded, and the remaining three obovate, trapezoidal or subcordate; a third row of five spots, the first second and fourth very large, the second cut by a bar of the ground color, and exterior to which, there is a buff streak; a small, oblong, silver dash between the second and fourth, and a prolonged silver bar beyond; anterior to the second, a round spot encircled with black, (this sometimes duplex), and nearer the abdominal margin an oblong mark; above, a short, silver bar cut by the subcostal vein,—costal margin, silvered heavily towards the base, and the abdominal, more lightly, as far as the anal angle.

Body dusky fulvous above, yellowish-white beneath; antennæ long, whitish on the under side near the base,—their middle, and tip of club, dark ferruginous,—club black.

*Female* is larger, (expanse 3—3.25 inches), upper surface more of an orange-fulvous, presents the lighter colored spots more distinctly, and has the outer margin, much more suffused with black. The short inner, transverse black bar, near the margin of the primaries, is not directed inwardly as in the *male*, but terminates upon the subcostal vein, at a much less angle; the distinctiveness of the S mark in the cell of the secondaries, is entirely lost, as the compressed lower limb is wholly merged into the body of the letter, and a slender continuation is carried up above the subcostal vein, beyond the curve of the upper limb; the large rounded dot within the cell, and another, outside, at the origin of the subcosto-anterior nervule.

Under surface chiefly as in the *male*, the color brighter, and greenish tinge more perceptible. Secondaries of a nearly uniform greenish-brown, the submarginal greenish-buff band, changed to a rich olive-green. Twenty-four silver spots—having, in addition to those of the *male*, a silver lune on the anal indentation, and a silver dash, between the first two spots in the third macular row; the rounded or duplicated spot of the *male*, is also enlarged to an oblong bar.

The wings of this species are relatively more narrow, and more elongated than in any member, with which I am acquainted, of this genus. The rich olive-green coloring of its hind wings, is however,

an all sufficient diagnostic. Mr. Edwards states that he obtained a specimen from Mr. Drexler, *said* to have been taken near Washington, D. C.: in this locality I do not believe, since it is strictly montane in its habits, and the distance from its authenticated habitat is too great to allow of the possibility of its being a straggler.

Mr. Ridings informs me that he collected this species in August, near Empire City, Colorado Territory, in the heart of the mountains only. It would seem to be rare, since he captured but three specimens (1 ♂, 2 ♀) which were taken early in the day, by the side of a small stream. Flight, not quick, and a proneness to settle in the sunlight, lazily opening and closing its wings, was very noticeable.

It gives me much pleasure to dedicate this fine species to the distinguished American Entomologist, Wm. H. Edwards, Esq., to whom I am indebted for many favors.

There is a peculiarity about the neuration of the wings of *Argynnis*, of which I have never seen any mention, although it is eminently characteristic, and forms a good method of discriminating between the series. Mr. Doubleday remarks (*Diurnal Lepidoptera* I, p. 173.)—"The males of some species, as *Argynnis Paphia*, *Arg. Adippe*, and *Arg. Sagana*, have the median nervules clothed with hairs and scales of a peculiar form, resembling those of the patch on the posterior wings of the males of *Lachnoptera Iole*."

Strange, that he should have overlooked the fact that in the *males* of *Argynnis*, the branches of the median vein of the fore wings are *always* thrown off, nearer the base than in the *females*. In some European species, as *Paphia*, this is very prominent; in many of our indigenous forms, it is not so patent, but I have never seen the distinction entirely to fail.

***Argynnis Hesperis*, Edwards.**

Proc. Ent. Soc. II, p. 502. (1864.)

*Hab.*—Rocky Mts., Colorado Territory. (Coll. Tryon Reakirt.)

I have two examples which differ as much from the type, and also from each other, as *Atlantis* from the allied species of *Daphnis* and *Aphrodite*. Whether they should be regarded as distinctive or not, can only be satisfactorily determined by an examination of a large series of specimens; in my own collection, I have, for the present considered them as varieties.

Very common in the mountains, during July and August.

***Melitæa Palla*, Boisd.**

Behr, Proc. Calif. Acad. Nat. Sciences. p. 88. (1863.)

*Hab.*—Rocky Mts., Cal. Terr.; California. (Coll. Tryon Reakirt.)



I have not seen the closely allied *Whitneyi* from the Rocky Mountains; all the specimens which I have examined from that locality are possessed of the diagnostic ocellus in each of the orange-colored spots of the submarginal band, on the under side of the secondaries, and I may here incidentally remark, that this characteristic is much more prominent in these, than in any Californian specimens, that I have seen; indeed, I have a ♀ example, which differs much from *Palla* in size and in the shape of the spots, and colorous dilution of the upper surface, and must have been regarded, but for the presence of these eye-spots, as new and undescribed.

Very common on the mountain roads in July.

*Melitæa Hoffmanni*, Behr.

Behr, Proc. Calif. Acad. Nat. Sciences, p. 89. (1863.)

*Hab.*—Rocky Mts., Colorado Territory; California. (Coll. Tryon Reakirt.)

One example of this very distinct species, differing in no respect from Californian specimens before me.

*Melitæa Chalcodona*, Doubled.

Diurnal Lepidoptera, I, p. 180, n. 21, t. 23, f. 1. (1847.)

*Hab.*—Rocky Mts., Colorado Territory; California. (Coll. Tryon Reakirt.)

*Melitæa Anicia*, Doubled.

Diurnal Lepidoptera, I, p. 179, n. 6, t. 23, f. 2. (1847.)

*Hab.*—Rocky Mountains, Colorado Territory; California. (Coll. Tryon Reakirt.)

Both these species, I have received from the west or Utéan side of the Mountains only, and have never seen either from their eastern slopes.

*Cooperi*, does not appear to inhabit this locality, and *nubigena*, also seems to be restricted to the west coast, whence I have specimens of both.

Following Dr. Cajetan Felder,\* and Mr. Hewitson,† I have considered the following species as belonging to the genus *Eresia*:

\*" *Melitæa Nycteis*, *Ismeria*, *Tharos*, *Thymetus*, *Theona*, und die verwandten Arten gehören wegen der dünner behaarten Palpen zu *Eresia*."—Ein neues Lepidopteron, &c., p. 49. (1861.)

†"I have thought.....that.....the North American species, which were put with *Melitæa* in Doubleday and Hewitson's Genera of Diurnal Lepidoptera, would be better associated with *Eresia*; they cannot be separated from *E. Heræ* and *Ianthe*, which Mr. Doubleday considered as belonging to this genus."—*Exotic Butterflies*, part 50. (1864.)

**Eresia Proclea**, Doubled. sp.

*Mel. Proclea*,—Diurnal Lepidoptera, I, p. 181, n. 27, t. 23, f. 4. (1847.)

*Hab.*—"Jamaica. B. M." ex Genera.

"Rocky Mountains, N. America." (Cat. Brit. Mus., viii, App. p. 20.) Which is correct?

**Eresia picta**, Edwards, sp.

*Mel. picta*, Edwards, Proc. Ent. Soc. iv, p. 201. (1865.)

*Hab.*—Nebraska and Colorado Territories. (Coll. Tryon Reakirt.)

Common in May, on the plains, from the River Platte to the base of the mountains; of low flight, but which is also quick and in jerks.

**Eresia Carlota**, nov. sp.

*Mel. Nycteis*, Edwards, Proc. Acad. Nat. Sciences, p. 161. (1861.)

non ——— Doubled. "Genera," I. p. 181, n. 23, t. 23, f. 3. (1847.)

*Hab.*—Rocky Mountains, Colorado Territory. (Coll. Tryon Reakirt.)

"Illinois, Missouri," Edwards.

I cannot imagine how Mr. Edwards could have regarded this very distinct species, as identical with Mr. Doubleday's figure; it no more resembles it, than does *Tharos*. Taken in June, among the mountains.

**Eresia Nycteis**, Doubled. sp.

*Mel. Nycteis*, Doubled., "Genera" I. p. 181, n. 23, t. 23, f. 3. (1847.)

non ——— Edwards, Proc. Acad. Nat. Sciences, p. 161. (1861.)

*Mel. Oenone*, Scudder, Proc. Essex. Inst. III, p. 166, n. 35. (1862.)

——— *Ismeria*, Edwards, in litt.

*Hab.*—Rocky Mountains, Colorado Territory; Missouri; New York, Virginia, (Coll. Tryon Reakirt.)

Middle States, (Coll. Brit. Mus.)

"Massachusetts; Maine," Scudder.

I have long believed that specimens of this species in my collection, from Missouri, were the veritable *Nycteis*, and in conversation expressed my opinion to Mr. Edwards; shortly after, I received examples of the same from him, ticketed *Ismeria*.

In a letter dated Nov. 27, 1865, I not only reiterated my former views, but added that I was impressed with the belief, although I had never beheld an authenticated example, that *Oenone* Scudder, would prove a synonym of the same.

A few days after, I received a letter, entirely confirming my supposition, thus establishing beyond doubt the newness of the preceding species, and from which I extract the following:—"Mr. Scudder writes from Paris \* \* \* \* that he has seen Dr. Bois-

duval and his collection, and mentions among other things that *M. Nycteis* of Doubled. is his *Oenone*."

**Eresia Tharos**, Drury sp.

*Hab.*—(Western)—Rocky Mountains, Colorado Territory, (Coll. Tryon Reakirt.)

A single *male* specimen, does not differ from well marked eastern examples.

**Eresia Campestris**, Behr sp.

*Melitæa Campestris*, Behr Proc. Calif. Acad. Nat. Sciences, p. 86. (1863.)

*Hab.*—California; Colorado Territory, (Coll. Tryon Reakirt.)

A single example is undistinguishable from those of California.

**Eresia pallida**, Edwards sp.

*Melitæa pallida*, Edwards, Proc. Ent. Soc. II, p. 505. (1864.)

*Hab.*—"Texas; Kansas," Edwards.

Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

A series of mutilated specimens, I have referred with much doubt to this species. They certainly do not correspond with any of Dr. Behr's species, although very near to *Campestris*. The median yellow band, differs, particularly upon the fore wings, from all the allied forms, in being semi-translucent.

**Eresia Mylitta**, Edwards sp.

*Melitæa Mylitta*, Edwards, Proc. Acad. Nat. Sciences, p. 160. (1861.)

— *Collina*, Behr, Proc. Acad. Calif. Nat. Sciences, p. 86. (1863.)

non — *Collina*, Lederer, Weiner Entom. Monatschrift, V. p. 1, 148, t. f. 1, 45. (1861.)

*Hab.*—California, (Coll. Tryon Reakirt.)

"Texas, Kansas, California," Edwards.

I am unacquainted with this species from Colorado.

**Eresia matā** nov. sp.

*Hab.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

The marginal row of lunules, upon the fore wings is complete, extending from margin to margin; the two inner bands are continuous, broad, and of equal width; the three, occupying the outer half of the surface, traversed by two narrow black strigæ.

Disposition of markings upon the hind wings, and underneath upon both wings, are similar to *Campestris* but somewhat enlarged.

The colors of the various pale bands, spots, &c., have unfortunately been bleached to a pure white; nothing but their outlines remaining to determine the species, but I am of the opinion, that these are sufficiently at variance with its allies, to establish its specific distinctiveness.

**Grapta Frogue**, Cram. sp.

*Hab.*—"Rocky Mountains, Colorado Territory," Edwards.

**Grapta Comma**, Harris, sp.

*Hab.*—Rocky Mountains, Colorado Territory; Phil., (Coll. Tryon Reakirt.)

My specimens do not differ from others captured in this neighborhood: a single example from California, which I refer provisionally to this species has each of the sub-marginal orange tawny lunules upon the hind wing's upper surface, pupilled with a very distinct rounded black dot, in other respects it agrees tolerably well with typical forms.

There is such an amount of variation common to all the species of this genus, that it is hardly safe to create one upon the peculiarities of a single, or indeed of a series of specimens.

**Vanessa Milbertii**, Godt. sp.

*Hab.*—Philadelphia, Illinois, Rocky Mountains, Colorado Territory, (Coll. Tryon Reakirt.)

**Vanessa Antiopa**, Linné sp.

*Hab.*—"This butterfly . . . . in America, extends from Hudson's Bay to the Rocky Mountains; and, southward, to the mountains of Mexico." E. Doubleday.

I have not received this species from Colorado.

**Limenitis Arthemis**, Drury sp.

*Hab.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

Does not differ from Eastern examples.

**Limenitis Weidemeyerii**, Edwards.

*Hab.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

A very full series of specimens, all agree exactly with Mr. Edwards' excellent description.

**Erebia Mancinus**, Doubleday.

Genera Diurnal Lepidoptera II, p. 380, n. 58, pl. 64, f. 2. (1851.)

*Hab.*—Rocky Mountains, (Coll. Brit. Mus.)

**Erebia Vesagus**, Doubleday.

Genera Diurnal Lepidoptera II, p. 380, n. 59, pl. 64, f. 2. (1851.)

*Hab.*—"Rocky Mountains?" ex-"Genera."

I am unacquainted with both of these species.

**Chionobas Uhleri**.

*Hab.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

*Male.* Upper surface, dull ochraceous yellow.

Costa of primaries flecked with darker-brownish scales, which extend, as a narrow band around the outer, and up the inner margin, terminating insensibly at a point just beyond the middle of the latter.

Midway between the discoidal cell and the outer margin, there are three blackish, slightly ovoid spots, in the second, third and fifth cells, that in the third much less than the others.

The secondaries also present a narrow marginal band of brown scales; the marblings of the under surface, seen through the semi-diaphanous wings, under the basal half of the surface somewhat deeper in color than the rest; a rounded black spot in each interspace between the second sub-costal and the first median veinlet—four in all, of which the two anterior are much the least.

Under surface. Primaries dirty grayish-white tinged with pale ochraceous; the terminal band of the upper side is reproduced, but very faintly, and also the three black spots, the upper being much enlarged and pupilled with grayish-white; some indistinct traces of this in the apical area; the cells filled with wavy black and whitish streaks and spots, principally congregated into five or six narrow transverse bars, of which the third and fifth are the most prominent; a line of flecks runs from the end of the cell to the middle of the inner margin, between which and the base are other indistinct waves.

Secondaries marbled with irregular markings of white, black, and brownish scales, sometimes congregated into spots—at others, disposed in transverse lines—the darkest portions nearest the base, the color decreasing in color outwards; the waves from the outer border of the transverse band are so interlaced, and contiguous, as to preclude all possibility of tracing any inner outline to this band; this outer, is more distinct, yet not nearly so well or clearly defined as in the allied species; the reticulations appear to be diffused over the whole surface; it, however, commences upon the costa, at a point, directly above two-thirds the length of the first costal vein, descends by a very slight curve, and almost at right angles to the costal margin, to the junction of the lower disco-cellular, with the third median veinlet, is superimposed upon this last, to its place of origin, and then traces a practically straight line to the inner margin, which it reaches nearly opposite the end of the body, in this respect differing very greatly from *Chryxus*, its nearest American congener: the four black spots are reproduced; the two exterior, pupilled with white. Expanse 1.75 inches.

Body black, ochreous on the under part of the abdomen.

*Female* differs from the *male*, only in the presence of four black spots on the under side of the fore wings, all pupilled with white, together with those upon the under side of the secondaries.

Expanse 1.69 inches.

*Hab.*—Rocky Mountains, Colorado Territory, (Coll. Tryon Reakirt.)

I take pleasure in naming this interesting species after my friend, Mr. P. R. Uhler, of Cambridge, Massachusetts.

*Chionobas Chryxus*, Doubleday.

Diurnal Lepidoptera II, p. 383, n. 13, pl. 64, f. 1. (1851.)

♂. Edwards, Proc. Entom. Soc. Phil. II. p. 82. (1863.)

♀. Seudder, Proc. Ent. Soc. Phil. V, p. 5, n. 2. (1865.)

*Hab.*—Pike's Peak, Colorado Terr., (Coll. Ent. Soc. Phil.)

There is an unnamed species of *Chionobas* in the Catalogue of the British Museum, which I suppose to be this.

*Satyrus Bidingii*, Edwards.

♀. Edwards, Proc. Entom. Soc. Phil. IV. p. 201. (1865.)

*Hab.*—Burlington, Boulder Co., Colorado Territory, (Coll. Wm. H. Edwards and Tryon Reakirt.)

*Male*, has a small black dot, with a very minute white pupil in the oval "soiled white" spots that is in the medio-central interspace of hind wings, in addition to the markings of the *female's* upper surface.

Underneath they are identical.

*Enodia Alope*, Fabr. sp.

*Hab.* California, Rocky Mountains, Colorado Territory, (Coll. Tryon Reakirt.)

Differs in nothing from Eastern specimens.

*Enodia Ariane*, Boisd. sp.

*Hab.* California, Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

*Enodia Sylvestris*, Edwards, sp.

*Satyrus Sylvestris*, Edwards, Proc. Acad. Nat. Sciences, p. 162. (1861.)

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

"California," Edwards and Behr.

*Cænonympha ochracea*, Edwards.

Edwards, Proc. Acad. Nat. Sciences, p. 163. (1861.)

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

"Lake Winnepeg, Kansas, California," Edwards.

In a note below, I have appended a description of the species of *Cænonympha*, referred to by Dr. Behr, in his "notes on Californian Satyrides" and concerning which, he remarks: "There exists a second *Cænonympha* in some sequestered valleys of the Northern Sierra, that approaches in its coloration, the European *C. Pamphilus*. I have only seen one pair of this species, and not possessing it, I cannot give

a diagnosis. It may be that it is identical with *C. Inornata* Edw., or *C. Ochracea*, Edw., or some Northern species.\*

***Thecla Mopsus***, Hubner sp.

*Hub.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

*Male* differs from Boisd. et Lec. figure, in the presence of two or three red lunules upon the anal angle.

*Female* has the upper surface sometimes immaculate, sometimes with very indistinct red lunules upon the anal angle as in the *male*, but all of my specimens are concolorous upon the fore wing: I have never seen examples from this locality, with the red patches upon the primaries as represented in the figure above referred to.

The under side conforms to the specific type.

***Thecla Nippon***, Hubner, sp.

*Hub.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

The specimens agree in all particulars with others from the Eastern States.

***Lycæna Rapahoe***, nov. sp.

*Hub.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

*Male*. Upper side, pale brown, glossed with blue nearly to the margin on both wings, leaving a broad terminal border of the ground color; this is edged exteriorly with a very narrow and black line, and beyond this, a white or whitish fringe: an indistinct row of blackish spots, marks the termination of the blue glossing upon the hind wings, and the beginning of the brown border: a black bar at the end of the cell of the fore wings.

*Female*. Upper side, pale or deep brown powdered with blue atoms only at the base, the rest of the markings as in the *male*.

Under side, ash gray, sometimes darker in the male: on the primaries a large discoidal lunule, and a transverse row of six large rounded spots, all jet black, and ringed with white; sometimes the last

\* ***Cænonympha pamphiloides***, nov. sp.

*Hab.*—California, (Coll. Tryon Reakirt.)

Upper surface very similar to *Pamphilus*; the ciliæ, however are considerably longer.

Under surface of the primaries as in *Pamphilus*; secondaries mottled greenish-brown from the base to the middle, abruptly terminated by a very irregular margin, adjoining which, on the upper half, from the costa, a yellowish-gray patch: hinder half of wings, of the same color as the basal portion, but very much diluted in tone; a sub-marginal row of six white spots, each encircled by a brownish-green ring—all minute, but still very distinct. Expanse 1.13–1.18 inches.

of these is divided by a slender white bar: between these and the margin another row of six or seven oblong brownish dashes, forming an almost continuous line.

The secondaries, have the base powdered with greenish-blue atoms; near to which, there is a transverse row of three rounded spots, one just below the upper third of the costa, another within the cell, and the third on the abdominal margin, at about half its length; an oblong discoidal streak; and two transverse macular rows, the inner of seven large rounded spots, the last sometimes geminate; the outer, minute, and of sagittate form; all these markings more or less encircled with white.

Expanse 1.25--1.38 inches ♂; 1.22--1.40 inches ♀.

Antennæ black annulated with white.

"Most probably an alpine variety of *Sæpiolus*, Boisd." Edwards in litt.

Having since received undoubted specimens of *Sæpiolus* from California, I find that they are very distinct, and constant in their differences throughout a long series of specimens which I have received.

*Lycæna Rustica*, Edwards.

*Hab.*—Pike's Peak, Colorado Territory, (Coll. Tryon Reakirt.)

*Lycæna Anna*, Edwards.

*Hab.*—Rocky Mountains, Colorado Territory, California, (Coll. Tryon Reakirt.)

*Lycæna Lycea*, Edwards.

*Hab.*—Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

*Lycæna Antægon*, Boisd. sp.

*Hab.*—Rocky Mountains, Colorado Territory; California, (Coll. Tryon Reakirt.)

My specimens of these, do not differ from Author's descriptions. The wings of *Acmon*. Westwood (from the figure,) differ in shape from those which I have identified as *Antægon* and would seem to indicate a distinct species, although the coloration of their upper surfaces is nearly similar.\*

\* *Lycæna Cajona*, nov. sp.

Upper side, violet blue with a pink tinge; a narrow terminal black line, and beyond a white fringe.

Underneath, ashy-white, with a bluish tinge at the base. Primaries, with a narrow discoidal arc; two round spots on the medio-central, and anterior interspaces, both black: and a double transverse sub-marginal macular row, brownish.



In the Catalogue of the British Museum, there are given *Lycæna*. n. 2792 and *Polyommatus*, n. 2796, as from the locality of the Rocky Mountains; these will probably be identified from among the preceding species.

***Polyommatus Helloides*, Boisd.**

*Hab.*—Rocky Mountains, Colorado Territory, California. (Coll. Tryon Reakirt.)

A very abundant species in both localities, and so far as I can judge from the examination of a very large series of specimens, subject to little or no variation, throughout its entire range.

***Polyommatus Castro*, nov. sp.**

*Hab.*—Rocky Mountains, Colorado Territory. (Coll. Tryon Reakirt.)

*Male.* Upper surface brown, with a broad blackish-brown border, on the outer margins of both wings; a brilliant violet reflection glosses the entire surface, rarely absent. Eleven black spots on the primaries arranged thus: one at the end of the cell, and two others within the cells at equal distances between the first and the base; a transverse row of seven, between the cell and the outer margin of which the last is duplex; the eleventh spot is found directly under the origin of the first, median veinlet. Secondaries, with a long black discal bar, and an intermediate row of seven black spots, between this and the margin, of which the third, fourth and sixth are the largest: a marginal series of fulvous lunules ranging from one to four in number.

Under side; primaries, yellowish ochreous, becoming grayish at the apex; the black spots of above, reproduced much larger, to which are added three or four semi-lunes, forming a sub-marginal row, running up from the inner angle and a small spot between the eleventh of the upper surface and the base. Secondaries, gray, brownish-gray, and

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Secondaries present two black spots, one near the middle of the abdominal margin, the other, in the medio-central interspace, just below the cell: the anterior series of spots belonging to the double sub-marginal row, here assume the form of slender brownish crescents, while the posterior are rounded, and the three or four nearest the anal angle, glossed with a metallic golden green; the two series are separated by lemon yellow lunules, becoming indistinct towards the outer angle: the terminal line, on both wings, is alternately white and brownish, the length of each space of color, being about equal to that of an interspace.

Expanse 1.25 inches.

*Hab.*—California, (Coll. Tryon Reakirt.)

Allied to *Anna* on the upper surface, but differing very decidedly from any known species on the under.

reddish-gray; two transverse black macular bands, of which the first near the base is composed of three spots, one near the costa, another within the cell, and the last in the medio-inferior interspace; the band is formed of eight small elongate black spots, running from the costa to the inner margin, midway between the cell and the outer margin: an indistinct sub-marginal row of fulvous lunules, sometimes rising to the outer angle. Fringe, light brown; expanse 1.12–1.30 inches.

Body, above black, below gray, grayish-brown.

Antennæ black, with incomplete white annulations, interrupted above; tip of club, fuscous.

*Female*, markings disposed as in the *male*, but of much greater size; terminal band much broader; color of the disc, lightened on both wings, and between the border, and the transverse macular bands, there is an almost continuous fulvous band, cut by darker veins, from the costa of the primaries to the abdominal margin, indistinct only upon the costal and anal borders of the secondaries; these last also present an additional black spot within the cell, otherwise the upper surface is the same as in the *male*.

Below, primaries orange brown, secondaries grayish-brown diluted with red; the markings larger, but placed as in the other sex. Expanse 1.25 inches.

*Var. Female*.—The disc of the primaries, and all the light spots of the secondaries, are pale ochraceous.

Below, yellowish-ochreous, the secondaries sprinkled with brown atoms; the rest as in the preceding.

Closely allied to both *Epixanthe*, and *Hellroides*, but constantly distinct from either.\*

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\*Another related form is the following:—

***Polyommatus Mariposa*, nov. sp.**

*Male*, upper surface, lustrous brown, a darker border extends all around the outer margins, upon which, on the secondaries there are vestiges of one or two fulvous anal lunules; a narrow black discal arc upon each wing.

Underneath, primaries, yellowish-gray, becoming pale grayish-brown on the costa; a terminal grayish brown border, interior to which there is a transverse band of six brownish black triangles, apices pointing inwardly, edged interiorly with a whitish streak, between these and the base, eleven brownish black spots, arranged as in *Castro*.

Secondaries, grayish brown. Four transverse macular bands, all black, the three first edged with white posteriorly, the fourth on both sides; they are arranged thus—the first, near the base, is formed of three widely separated spots, the first two round, the third, an oblong streak; the second, of four much larger spots, one near the costa, another within the cell, and the other two respective-

**Pyrgus Ricara**, Edwards sp.

*Hab.* Empire City, Colorado Territory, (Coll. Tryon Reakirt.)

**Pyrgus Oileus**, Linné sp.

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

One of the commonest of species; my specimens are very much paler in color than any of *Oileus* that I have ever seen, otherwise they do not differ.

**Nisoniades Catallus**, Fabr. sp.

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

**Hesperia Huron**, Edwards.

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

**Hesperia Napa**, Edwards.

*Hab.* Empire City, Colorado Territory, (Coll. Tryon Reakirt.)

**Hesperia Omaha**, Edwards.

*Hab.* "Pike's Peak" Edwards.

**Hesperia Kiowah**, nov. sp.

*Male.* Uniform dull brown on both sides, no marking, save the narrow black sexual bar on the primaries. Expanse 1.19 inches.

*Hab.* Rocky Mountains, (Coll. Tryon Reakirt.)

**Hesperia Garitá**, nov. sp.

Upper surface, uniform dark brown, glossed with tawny, at the extremities.

Under surface dark brown, costa and apex of primaries, tawny: the secondaries from the first median veinlet upward are tawny-ashcolored: the rest brownish-black glossed with tawny at the anal angle. The fringe is brown; a narrow white or whitish line covers its inner half,

ly in the medio-inferior, and sub-median interspaces; both of these rows form nearly straight lines; the third is very irregular, and composed of seven spots, the fifth being round, the others lunate, and is midway between the cell and the outer margin; the fourth contains seven spots, and is sub-marginal; of these the first is minute, the five following sagittiform, and the last lunate. Fringes brown; expanse 1.20—1.25 inches,

Body black above, covered with brown hairs, whitish-gray below; antennæ black, ringed and tipped with white.

*Female.* Upper surface fulvous, spotted as in *Castro*. ♀ with a broad brownish border: on the secondaries this contains a continuous row of fulvous crescents, extending from costa to anal angle; a brown shade covers the base of each wing and the abdominal marginal of the secondaries; otherwise as in the *male*.

*Hab.*—California, (Coll. Tryon Reakirt.)

upon the upper half of each wing, in no place extending upon the wing surface; forming a most excellent diagnostic.

Palpi, white or whitish; Expanse 1 inch.

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Tryon Reakirt.)

*Hesperia Bidingsii*, nov. sp.

*Hab.* Rocky Mountains, Colorado Terr., (Coll. Ent. Soc. Phil.)

*Female.* Dark olive brown; primaries glossed with fuscous at the base and on the inner margin; a large subquadrate white spot at the end of the cell; half way between this, and the apex, three small spots run down from the costa; an interrupted maculate band rises from the middle of the sub-median vein nearly to the outer margin, the terminal spot, irregularly plano-convex, is opposite to the discal one; of the four following, the first is a truncate cone, the second; very large, and the third minute, all these are white; the fourth is fuscous, and loses itself outwardly in a group of atoms of the same color.

Secondaries, have a spot within the cell, and five others between it and the margin, all ochreous.

Below, the costa of the primaries, and their inner margin are pale grayish-green; the rest of the surface olivaceous, greenish towards the costa, on which the markings of above are repeated. Secondaries greenish, cut with white veins; a white spot in the cell, followed by a very irregularly margined band of the same color, and nearly forming a rectangle: the spaces between the central spot and this band, as well as slightly above and below both, are olive brown; the two interspaces between the spot and the apex of the rectangle, retain the ground color. Fringe whitish; expanse 1.40 inches.

Body black brown covered with olive brown hair; grayish brown and whitish below; a collar of white hairs.

**Descriptions of new species of North American FORMICIDÆ.**

BY S. B. BUCKLEY.

About five years ago, while we were engaged in the Geological Survey of Texas, our attention was frequently drawn to the Ants and their wonderful works, which, in Texas, evince so much intelligence, industry and perseverance, as to attract the attention of the most ordinary observer. Finally, although pressed with other duties, we gave a large portion of our leisure to collecting them and observing their habits, which we have continued to do up to the present time, with much pleasure and satisfaction.

The following described species were collected by us, unless otherwise stated.

To Mr. Edward Norton, of Connecticut, the well-known Entomologist, who has made the Hymenoptera a special study, we are indebted for many European species (which are useful for comparison,) and also for many new American species, as will be seen in the following pages.

We are also under obligations to Dr. J. L. LeConte of Philadelphia, for access to his valuable entomological library, and for the loan of a French Edition of Latreille's *Histoire Naturelle des Fourmis*, which contains figures of 75 species of Ants. This work, although old, is still of great service in the study of this Family, because subsequent authors often refer to its figures.

The large libraries of the Academy of Natural Sciences of Philadelphia, and of the Entomological Society of the same city, have afforded the greatest aid; for without their assistance, the following descriptions could not have been written. Most of what has been published on Ants, is scattered through the publications of learned Societies, which are found in but few of the libraries in our country.

Dr Gideon Lincecum, Sen'r, of Washington Co., Texas, has collected 34 species of Ants in his neighborhood, and although we have also found most of them, still the Doctor has given valuable assistance.

Mr. Frederick Smith, in his Catalogue of the Hymenoptera in the British Museum, states that there are 490 species of Ants on record.

Mr. Bates, who has collected for some years in Brazil, thinks the number of species in the Valley of the Amazon, cannot be less than 400.

There are about 100 species of Ants in Europe. Nylander enumerates 68 species in France and Algiers. There are probably at

least 200 species within the United States, a large portion of which still remain undescribed. We think Texas alone contains more than 100 species.

1. *Formica Nova Anglæ*, n. sp.

*Female.* Length 0.32 inch.—Wings extend about a line beyond the abdomen, and have one marginal, two sub-marginal and one discoidal cells; head subquadrate, slightly rounded above, occiput emarginate, with its posterior angles rounded; eyes rather small, circular, placed near the sides and near the occiput; antennæ rather short, slightly clavate, inserted a little in front of the vertex; mandibles enlarged in front, curved inwards, toothed, apical tooth long and acute, inner margins tinged with black; clypeus subcarinated, under surface of the head rounded, with a very slight, longitudinal depression; prothorax nearly equal in width to the head, rounded, smooth above, somewhat compressed at the sides and divided by a narrowed band, slightly depressed into an upper and lower portion; mesothorax short, not depressed, its upper surface sub-piceous; metathorax narrowed posteriorly, descending gradually to the pedicle; scale large, slightly inclined forwards and wedge-shaped; abdomen sub-truncate in front, round-ovate, subobtusè; legs long and slender; whole ant smooth and shining; posterior part of the abdomen sprinkled with a few hairs.

*Worker.* Length 0.22 inch.—Head wider than the prothorax, and but slightly emarginate; mesothorax depressed and strangulated; metathorax raised, narrowed upwards, and rounded above; otherwise like the female.

*Hab.*—Maine, (Norton).

2. *Formica Nortonii*, n. sp.

*Worker.* Length 0.23 inch.—Upper surface of thorax and abdomen and the back part of the head, dark reddish-brown, the rest yellowish-red or pale yellow; head subtriangular, round above, not emarginate, posterior angles rounded; eyes large, subelliptical, lateral, placed on the upper surface, a little behind the middle; mandibles rounded at base, then subtriangular and many toothed, apical tooth long, curved in and acute; antennæ inserted near the base of the clypeus, subclavate, long, filiform; clypeus slightly carinated; under surface of the head not channelled, prothorax little narrower than the head, round in front, at top and sides, and widest posteriorly; mesothorax slightly depressed in front, somewhat strangulated at its junction with the metathorax, and narrower than the pro- or metathorax; metathorax slightly compressed and inclined gradually to the pedicle, which is inserted

in the anterior base of the abdomen; scale large, wedge-shaped, vertical; abdomen broad ovate; legs long, slender; upper surface of head and abdomen thinly sprinkled with short, white hairs.

*Female*. Length 0.30 inch.—Head ovate, small, three-fourths as wide as the prothorax; prothorax compressed at the sides, rounded in front and somewhat flattened above; mesothorax convex on the upper surface, which is as high as the prothorax and nearly as wide; metathorax compressed, narrowed black, sloping gradually to the pedicle; wings with one marginal, two submarginal and no discoidal cells, extending 0.10 inch beyond the abdomen; otherwise like the worker.

*Hab.*—Connecticut, (Norton).

3. *Formica americana*, n. sp.

*Female*. Length 0.29 inch.—Wings extending 0.08 beyond the abdomen, with one marginal and two submarginal cells; black; mouth, trochanters and tibiæ, dark reddish-brown; tarsi reddish-yellow; head narrower than the prothorax, ovate, rounded above, at the sides and occiput; eyes large, prominent, elliptical, placed about midway on the sides; antennæ long, filiform and not enlarged towards their apical joints, inserted at the base of the clypeus; ocelli 3, placed at top of occiput; mandibles widened anteriorly and toothed; under surface of the head not channelled; prothorax elevated, round above in front, and somewhat compressed at the sides; mesothorax a little higher than the prothorax, rounded above, and narrowed behind; metathorax depressed and but a little narrower than the prothorax, subtruncate; scale large, wedge-shaped and vertical; abdomen subtruncate in front, ovate and subacute, the last segment thickly sprinkled with hairs; legs slender.

*Worker*. Length 0.20.—Head and abdomen black; thorax and legs dark reddish-brown, with lighter shades of yellowish-red; smooth and glossy throughout; prothorax about one-third narrower than the head; scale small, thin, wedge-shaped; the whole thorax compressed at the sides and narrowed behind, its divisions not strongly marked; abdomen ovate, the margins of the segments hyaline; otherwise like the female.

*Hab.*—Connecticut, (Norton).

4. *Formica Connecticutensis*, n. sp.

*Worker*. Length 0.22 inch.—Black; head ovate, rounded above, at sides and posteriorly; eyes large, circular, sublateral and near the posterior angles; antennæ inserted near the base of the clypeus, long, filiform, and very little enlarged towards their apical joints; mandibles

subtriangular, finely toothed on their inner margins; prothorax one-third narrower than the head, round above, in front, at the sides, and widest in the middle; mesothorax compressed, inclined posteriorly, and strangulated at its junction with the metathorax; metathorax raised, compressed, widened posteriorly, subtruncate; pedicle rather long; scale vertical, thin, wedge-shaped; abdomen round-ovate, and thinly sprinkled with short, white hairs; legs long, slender.

*Female.* Length 0.43 inch.—Tibiæ, tarsi and part of the trochanters, reddish-yellow, the rest black; head narrower than the prothorax; mesothorax raised, higher than the prothorax and rounded above; abdomen oblong-ovate; wings extending 0.12 inch beyond the abdomen, with one marginal, two submarginal and one discoidal cells; otherwise like the worker.

*Hab.*—Connecticut, (Norton). We have also found this species in the vicinity of Washington, D. C., and near Naples, in Western New York.

For the convenience of American Students, we append the following description of *Formica Pennsylvanica* of DeGeer, which is figured and partly described by Latrielle.

*Formica Pennsylvanica*, DeGeer.

*Female.* Length 0.68 inch.—Wings with one marginal and two submarginal cells, no discoidal cell; black; under surface of the thorax and the abdomen, and legs spotted more or less with reddish-brown, the black predominating; head large, broad ovate, rounded at the sides and posterior angles; occiput not emarginate; eyes circular, not prominent, placed behind the middle near the posterior angles; ocelli none; antennæ inserted a little back of the base of the clypeus, filiform, very slightly, if any, enlarged towards their apical joints; thorax a little narrower than the head, rounded above, at the sides and in front, where there is a narrow, impressed band which extends around to the sides, and is tinged with reddish-brown; mesothorax not depressed, rounded above and narrower than the prothorax, with a narrow, slightly depressed band between it and the metathorax; metathorax short, depressed, narrower than the pro- or mesothorax, and steep to the pedicle; scale thin, wedge-shaped, vertical; abdomen oblong-ovate; margins of the segments with narrow hyaline bands, and are thickly fringed with hairs.

*Worker.* Length 0.39 inch.—Thorax one-third narrower than the head; whole thorax narrowed behind, with no depression of its divisions; metathorax slopes gradually to the pedicle; otherwise like the female.



This is the common wood ant, which extends from New England to Texas. It is quite variable in size. Our measurements are from the largest specimens.

5. *Formica gnava*, n. sp.

*Female*. Length 0.35 inch.—Black or brownish-black, margins of the segments of the abdomen, and also the legs, pale yellow or hyaline; head small, triangular, depressed and flattened above; eyes very large, prominent, elliptical, lateral, and behind the middle of the head; ocelli 3, prominent and at top of the occiput; clypeus raised and oval; prothorax large, wider than head, rounded above, subcompressed at the sides, its posterior part widest; mesothorax small, raised as high as the prothorax, rounded above, and with a slight depression between it and the metathorax, which is short, and subtruncate; scale wedge-shaped, vertical; abdomen large, broad ovate; wings extending beyond the abdomen, with one marginal, two submarginal, and one discoidal cells. Otherwise like the worker.

*Male*. Length 0.29 inch.—Thorax but little wider than the head; abdomen ovate, short. Otherwise like the female.

*Worker*. Length 0.18 inch.—Smooth throughout; head, thorax, and legs yellowish-red; abdomen black, or piceous; when first caught or seen in their cells, the whole seems to be of a bronze color; head ovate, rounded above, below and behind, with a slight depression at the base of the clypeus, which is subcarinated; antennæ long, filiform and slightly enlarged towards their apical joints; mandibles large, short, strangulated in the middle, then curved inwards, and widened, 7-toothed; eyes large, subelliptical, lateral, and a little behind the middle of the head, near the upper surface; prothorax little more than half the width of the head, rounded above and enlarged anteriorly; mesothorax depressed, inclined back, with a slight strangulation between it and metathorax; metathorax large, widest in the middle; scale large, wedge-shaped, and slightly inclined forwards; abdomen ovate; legs long.

*Hab*.—Central Texas; Washington, D. C.; Naples, New York; Connecticut, (Norton).

Very active and brave; bites sharply, and emits a strong odor of formic acid. Has cells in the ground, sometimes to the depth of two or more feet, forming small mounds with the excavated earth. Is solitary in foraging, scattered here and there over the surface of the ground.

6. *Formica occidentalis*, n. sp.

*Female.* Length 0.32 inch.—Wings extending 0.08 inch beyond the abdomen, with one marginal, two submarginal and one discoidal cells; upper surface of occiput, thorax and abdomen black or piceous, the rest reddish-brown, spotted with piceous; head subovate, the sides slightly rounded, its upper surface but little oval, and its posterior angles a little rounded, the occiput nearly straight between them; antennæ short, the club and flagellum of nearly equal length, clavate, joints very short; mandibles large, curved inwards and downwards, 5-toothed, apical tooth long, acute; eyes small, circular, sublateral, and a little back of midway of the head, which is a little wider than the prothorax and not sinuate below; prothorax subcompressed at the sides, rounded above, widest behind; mesothorax not depressed, equal in width to the prothorax, rounded somewhat at the sides; metathorax narrowed behind, subtruncate; scale large, wedge-shaped, vertical; abdomen ovate, oblong, subtruncate in front, obtuse behind; legs short, slender; upper surface of head, thorax, scale, pedicle and last segment of the abdomen, thickly sprinkled with hairs.

*Worker.* Length 0.11 inch.—Upper surface of head, thorax and abdomen, reddish-yellow or pale yellow, the rest pale yellow; head broad, ovate, rounded above, at sides and posterior angles; prothorax about one-third narrower than the head, round above, in front, at sides, widest in the middle; mesothorax narrower than the pro- or metathorax, and strongly depressed at its junction with the metathorax; metathorax nearly as wide as the prothorax; rounded above and at its sides, subtruncate; otherwise like the female.

Dwells beneath stones, in the ground, on hills at Naples, in Western New York; we have also received it from Mr. Norton of Connecticut.

7. *Formica monticola*, n. sp.

*Worker.* Length 0.10 inch.—Upper surface of head, thorax and abdomen, reddish-brown; legs and under surface honey-yellow; head subovate, rounded above and behind, not emarginate, a shallow sinus below; antennæ filiform, a little enlarged towards their apical joints; eyes black, circular, lateral, and about midway of the head; mandibles subtriangular, curved inwards and downwards, toothed; prothorax rounded above, at the sides, in front, widest in the middle; mesothorax narrower than the pro- or metathorax, raised and rounded in the middle, subtrunculated behind; metathorax about equal in width to the prothorax, somewhat rounded above, subtruncate behind; pe-

dicle short and inserted in the base of the abdomen a little in front of the centre; scale large, vertical, wedge-shaped; legs long, slender; abdomen broad-ovate, upper surface of the head and posterior part of the abdomen sprinkled with short hairs.

*Female*. Length 0.30 inch.—Wings extend beyond the abdomen 0.11 inch, with one marginal, two submarginal, and one discoidal cells; dark-brown or piceous above; legs and under surface pale yellow or yellowish-brown; head not channelled below; prothorax about one-fourth wider than the head; mesothorax not depressed, rounded above; metathorax short, depressed, subtruncate; scale vertical and wedge-shaped, and concealed between the thorax and abdomen; abdomen large, long, ovate; legs short and slender; whole ant smooth, not hairy. Otherwise like the worker.

*Male*. Length 0.11 inch.—Head very small; eyes large; prothorax one-half wider than the head; abdomen small, subtruncate in front, ovate, acute. Otherwise like the female.

Dwells in the ground, beneath stones, on the hills near Naples, in Western New York. Winged in May.

8. *Formica gracilis*, n. sp.

*Female*. Length 0.18 inch.—Black or piceous; legs pale yellow or piceous; wings projecting nearly a line beyond the abdomen, with one marginal, two submarginal and one discoidal cells; head subtriangular, not emarginate, posterior angles rounded above and at the sides; antennæ in a slight depression at the base of the clypeus, rather short, and but little enlarged towards their apical joints; eyes large, prominent, circular, lateral, placed near the top and a little in front of the middle; mandibles small, curved inwards and downwards, and acute; prothorax about equal in width to the head, rounded above, in front, and at the sides, and widest posteriorly; scale small, partly concealed by the abdomen; pedicle short, inserted in the base of the anterior portion of the abdomen; abdomen oblong, ovate, subobtuse; legs short, slender; whole ant smooth, shining, and of slender form.

*Worker*. Length 0.12 inch.—Head wider than the prothorax; prothorax rounded above, in the front, and at the sides, widest in the middle; divisions of the thorax strongly marked; mesothorax slightly depressed, compressed and narrowed behind; metathorax small, compressed; abdomen broad, ovate, obtuse. Otherwise like the female.

Dwells in the ground beneath stones, on the hills, at Naples, New York. Winged females caught in May.

9. *Formica parva*, n. sp.

*Worker*. Length 0.10 inch.—Black; legs piceous; smooth throughout and of slender form; head ovate, rounded above, at the sides and behind, not emarginate; eyes large, elliptical, in front of the middle near the sides; antennæ long, subclavate, inserted at the base of the clypeus; mandibles small, curved in, acute; head broad, sinuate below; prothorax narrower than the head, somewhat flattened above, rounded at the sides, widest in the middle; mesothorax somewhat depressed, narrowed behind; metathorax compressed; scale small, nodose; pedicle short, and inserted in the anterior part of the base of the abdomen; abdomen broad, ovate, acute.

*Hab*.—Near Washington, D. C., beneath stones.

10. *Formica atra*, n. sp.

*Worker*. Length 0.19 inch.—Black; trochanters, tibiæ and tarsi subhyaline; head subovate, rounded above, at the sides, and at the posterior angles; occiput not emarginate, front of the head of about the same width as the back; antennæ inserted at the base of the clypeus, long, filiform, and not clavate; eyes small, circular, lateral, and a little back from the middle of the head; mandibles small, curved inwards, and toothed on their inner margins; head not sinuate below; prothorax but little narrower than the head, rounded above, in front and at the sides, widest a little in front of its middle; meso- and metathorax compressed and narrowed back in the same plane; metathorax subtruncate; scale narrow transversely, wedge-shaped; pedicle inserted in the anterior part of the base of the abdomen; abdomen obovate, the first segment round, narrow in front, widened behind; legs long, slender; whole ant of slender, elongated form, smooth and shining; the upper margins of the segments of the abdomen thinly sprinkled with hairs.

*Hab*.—On trees in the environs of Washington, D. C.

11. *Formica Virginiana*, n. sp.

*Worker*. Length 0.20 inch.—Reddish-yellow; head ovate, rounded above, at the sides and behind; eyes large, black, circular, lateral, near the top about midway of the head; antennæ inserted at base of the clypeus, long, clavate; mandibles large, subtriangular, curved in at the apex, 5-toothed, apical tooth long, acute; clypeus somewhat depressed, round, smooth, under surface of the head not channelled; prothorax narrower than the head, rounded above, in front, at the sides, widest in the middle; mesothorax narrower than the pro- or metathorax, compressed, and depressed back to the metathorax, where

there is a slight strangulation; metathorax raised, widened, descends gradually to the pedicle, which is inserted in the front base of the abdomen; scale large, vertical, wedge-shaped; abdomen truncate in front, broad ovate, obtuse, thinly sprinkled with hairs; legs very long, slender; whole ant smooth and shining.

*Hab.*—On trees in the Capitol Park at Washington, D. C. Not common.

12. *Formica arenicola*, n. sp.

*Worker.* Length 0.13 inch.—Upper surface of head, thorax and abdomen black or piceous, spotted with pale yellow beneath; legs, antennæ and mandibles pale yellow; head ovate, round above; occiput not emarginate; antennæ inserted at the base of the clypeus, long, clavate; eyes large, black, elliptical, in the upper surface of the sides of the head, about midway; mandibles triangular, acute and finely toothed on their inner margins; under surface of the head not sinuate; prothorax about one-half the width of the head, round above and at sides, widest in front; mesothorax compressed and not depressed; metathorax narrowed behind and inclined gradually to the pedicle; divisions of the thorax not strongly marked; pedicle short and inserted in the base of the abdomen a little in front of the middle; scale large, wedge-shaped, inclined forward to the metathorax; abdomen subtriangular, with a broad base in front; whole ant smooth and shining, not hairy.

*Hab.*—Found in sandy soil near Washington, D. C. Has cells but a few inches deep.

13. *Formica politurata*, n. sp.

*Worker.* Length 0.16 inch.—Mouth, antennæ, thorax, legs, pedicle and scale, yellowish-brown, with piceous spots; the rest black; the whole surface smooth and shining, with a few short hairs on the abdomen and upper surface of the head; head ovate, rounded above, at sides and at posterior angles; eyes circular on the upper surface, sub-lateral, large, and placed about midway of the head; antennæ inserted at the base of the clypeus, slightly clavate; mandibles small, short, curved in, toothed and acute; prothorax one-fourth narrower than the head, rounded at its sides and somewhat flattened above, widest in the middle; mesothorax not depressed, slightly compressed, higher and narrower than the prothorax; metathorax still narrower, sloping gradually to the pedicle; scale vertical, thin, wedge-shaped; abdomen ovate, obtuse.

*Hab.*—Michigan, (Norton).

14. *Formica septentrionale*, n. sp.

*Worker*. Length 0.25 inch.—Head and abdomen black; thorax, legs and scale reddish-brown, with piceous spots; head broad, oval or subquadrate, the front, back of the mandibles, as broad as the occiput, the sides, posterior angles and upper surface rounded, under surface sinuate; antennæ long, filiform, and but slightly enlarged towards the apical joints; eyes lateral, circular, and a little back of the middle; mandibles small, curved inwards, acute; prothorax one-third narrower than the head, round above and in front, slightly compressed at the sides, widest in the middle; mesothorax not depressed, slightly rounded above, compressed at sides, narrowed behind, having a triangular outline, with its apex back seen from above; metathorax narrow, short, compressed, subtruncate; scale thin, wedge-shaped, vertical; abdomen round-ovate; margins of the segments hyaline; whole ant smooth, without hairs, and shining.

*Female*. Length 0.30 inch.—Wings extend 0.05 inch beyond the abdomen, with one marginal and two submarginal cells, discoidal cell obsolete; a very few scattering hairs on the abdomen; otherwise like the worker.

*Hab*.—Michigan and Illinois, (Norton).

15. *Formica Floridana*, n. sp.

*Worker*. Length 0.28 inch.—Abdomen black, the rest yellowish-red; head subcordate, rounded above, occiput emarginate, with the posterior angles rounded; two short channels a little diverging extend back from the clypeus to the vertex; antennæ inserted a little in front of the vertex; long, filiform, and but little enlarged towards the apical joint; eyes of medium size, circular, placed on top near the sides and little back of the middle, prominent; mandibles reddish-brown, curved inwards and toothed, apical tooth long, acute; under surface of the head sinuate; prothorax narrower than the head, rounded above, in front and at the sides, widest near the front; mesothorax compressed, narrowed backwards, not depressed; metathorax narrowed behind, and descends gradually to the pedicle; scale large, vertical and wedge-shaped; abdomen broad, ovate, subacute, margins of its segments slightly hyaline; legs long, slender; thorax throughout rather thickly sprinkled with long gray hairs.

*Hab*.—Florida, (Norton).

16. *Formica Tejonis*, n. sp.

*Male*. Length 0.39 inch.—Black; tarsi dark reddish-brown; head small ovate, rounded above, at sides and behind; eyes large, promi-

ment, sublateral, and placed about midway of the head on the upper surface; antennæ inserted in front a little back of the base of the clypeus; mandibles slender, widened anteriorly, toothed on the inner margins; ocelli prominent and on top of the occiput; under surface of the head somewhat flattened, not sinuate; prothorax one-fourth wider than the head, rounded above, at the sides and in front, widest in the middle; mesothorax not depressed, about as wide as the prothorax and rounded at the sides; metathorax a little depressed and a little narrower than the mesothorax, subtruncate; scale incrassate, thick, wedge-shaped; abdomen truncate in front, oblong ovate, acute; legs slender; upper surface of the head, back part of the thorax and abdomen thinly sprinkled with hairs; whole surface smooth and shining; wings extend 0.12 inch beyond the abdomen, with one marginal and two submarginal cells, no discoidal cell.

*Hab.*—Fort Tejon, California, (Norton).

17. *Formica tenuissima*, n. sp.

*Worker.* Length 0.09 inch.—Reddish-yellow; legs pale yellow; head triangular, rounded above and behind, and slightly so on the sides; eyes large, circular, lateral, and placed in front of the middle; antennæ long, filiform and not clavate; mandibles small, slender, curved inwards and downwards, acute; under surface of head longitudinally sinuate; prothorax narrower than the head, round and smooth above and in front, where it is widest, a slight depression between the meso- and metathorax; metathorax nearly as high as the prothorax, but narrower; pedicel short; scale large, erect, wedge-shaped, and slightly inclined forwards; abdomen ovate, obtuse; legs long, slender; whole ant smooth, with a few scattering hairs on its upper surface.

*Hab.*—Central Texas, in ground beneath stones. Rare.

18. *Formica perminuta*, n. sp.

*Worker.* Length 0.08 inch—Yellow or reddish-yellow; legs and abdomen yellowish-brown; head subtriangular, rounded above, occiput emarginate, the posterior angles slightly rounded; eyes large, circular, in front of the middle, and on top of the head near the lateral margins; mandibles slender, somewhat projected in front, curved near the apex, with five minute teeth; club of the antennæ equal in length to the flagellum, which is short-jointed; prothorax narrower than the head, smooth and rounded in front, above, and largest about one-third distance back to the mesothorax, which is depressed or slightly strangled at its junction with the metathorax; metathorax round and smooth above, slopes gradually to the pedicel, which is short and in-

serted in the base of the abdomen a little in front of the middle; scale small, wedge-shaped and inclined towards the front; abdomen ovate; upper surface of the thorax and abdomen sprinkled with hairs.

*Hab.*—Central Texas, in the ground near the surface.

19. *Formica picea*, n. sp.

*Worker.* Length 0.06 inch.—Head and abdomen pitchy-black, the rest smoky-yellow; head quadrangular, seen from above, its sides nearly straight; posterior angles slightly rounded and also its posterior margin, which is also nearly straight; antennæ long, clavate, inserted near the base of the clypeus; clypeus oval, with a small depression at its base; eyes large, subcircular, prominent, and placed in the upper surface of the head near the sides, about midway; mandibles small, subtriangular and curved inwards; prothorax narrower than the head, rounded above, in front and at the sides, largest posteriorly; mesothorax narrower than either the pro- or metathorax and slightly depressed; metathorax raised, rounded and smooth above, subcompressed at its sides, subtruncate; pedicel short, and inserted in the base of the abdomen a little in front of the middle; scale large, sub-wedge-shaped, vertical; abdomen broad ovate, subobtuse, its upper surface thickly sprinkled with hairs; legs long, slender.

Active; dwells beneath rocks in the vicinity of Austin, Texas. Rare.

20. *Formica Lineocumii*, n. sp.

*Female.* Length 0.35 inch.—Black; wings of a reddish-brown color, extending 0.12 inch beyond the abdomen, with one marginal, two submarginal and one discoidal cell; head a little narrower than the prothorax, ovate, round at occiput and sides; antennæ inserted at base of the clypeus, long, filiform, and slightly enlarged towards their apical joints; eyes subelliptical, prominent, and placed near the top of the posterior angles; a small channel extends from the base of the clypeus to the occiput; mandibles subtriangular and toothed on their inner margins; prothorax flattened at its sides, but little rounded at the top, a broad band, thickly sprinkled with short white hairs, in front and extending around to the sides; mesothorax not depressed, as wide as the prothorax; metathorax depressed, short and subtruncate; pedicel short; scale thin, wedge-shaped, vertical; abdomen large, round ovate, obtuse, and thickly sprinkled with hairs posteriorly; legs short, slender.

*Worker.* Length 0.20 inch.—Under side of thorax and legs spotted with dark reddish-brown, black predominating; under surface of head smooth and rounded; head one-fourth wider than the prothorax;



prothorax round above, in front and at the sides, widest in the middle; mesothorax narrowed behind, a small strangulation between it and the metathorax; metathorax raised, widened behind, truncate; abdomen small ovate; legs long, slender; otherwise like the female.

*Male.* Length 0.34 inch.—Trochanters, tibiæ and tarsi pale yellow; head very small and one-third narrower than prothorax; eyes very prominent, large, lateral, and gray; abdomen oblong-ovate; the rest like the female.

Dwells in trees. Texas.

21. *Formica festinata*, n. sp.

*Female.* Length 0.50 inch.—Honey-yellow, with dark brown on the abdomen, thorax and head; wings projecting but little beyond the abdomen, with one marginal and two submarginal cells; head oblong-subtriangular, rounded and smooth above, emarginate behind, posterior angles rounded; eyes black, large, prominent, placed on the sides of the head near the anterior portion of the occiput; ocelli situated back of the vertex on the upper part of the occiput; antennæ long, filiform; mandibles brownish-black, short, large, curved inwards, having each seven blunt teeth on the inner margins; thorax about equal in width to the head, its sides compressed and narrowed posteriorly; posterior margin of the prothorax and entire upper margin of the mesothorax, blackish-brown, the margins being slightly raised, metathorax lower, oval, smooth and rounded; pedicle short, scale large, erect and somewhat compressed; abdomen oblong-ovate, with a few scattering hairs on the margins of the segments which are brown or brownish-black; legs long, slender. The entire insect is smooth and shining.

*Worker.* Length 0.28 inch.—Honey-yellow, or colored like the female; ocelli none; head wider than the thorax; thorax smooth, with the divisions well marked; abdomen ovate, pointed; the remainder like the female.

The workers of this species vary in size and somewhat in color, the largest being often tinged with brownish-black like the females. Those tinged are probably the oldest, and this may be the cause of the difference. The length given is that of one of the smallest. Both sizes work in common. They are very active, travelling beneath rocks or sticks where they have cells and galleries in the earth to the depth of twelve or eighteen inches. They are not war-like, and rarely bite when caught, nor are they often seen in the open air, hence they probably seek food by night.

Common in Central Texas. Winged females caught in September.

22. *Formica insana*, n. sp. ("Crazy Ant.")

*Worker.* Length 0.14 inch.—Color black or brownish-black, smooth and shining throughout; head sub-quadrate, the lateral margins slightly curved inwards; below oval and rounded above; eyes large, sub-elliptical, and placed on the anterior portion of the head near its lateral margins; antennæ long, filiform; mandibles large, curved inwards, the truncated apical ends sharply toothed; head sub-channelled beneath, with the anterior and posterior parts deeply depressed; prothorax about half the width of the head, rounded above; mesothorax somewhat depressed; metathorax has a rudimentary spine or sharp protuberance on its upper posterior surface, pedicle short, inserted near the base of the anterior part of the abdomen; scale small, wedge-shaped, and inclined forwards; abdomen broad-ovate, subacute; legs small, slender, and rather short.

*Female.* Length 0.20 inch.—Head small, narrower than the thorax; abdomen broad, oblong and ovate; color black-bronze, with the margins of the segments of the abdomen hyaline; thorax raised above the head; wings not seen; the remainder like the worker.

Dwells in the ground but a few inches deep, having numerous holes scattered over a large surface of fifty or more feet in diameter. It goes now here and now there, without order, from one abode to another, sometimes moving the larvæ from one place to another; large colonies dwelling in common. It is very active and war-like, can conquer most other ants, boldly seizing the larger species by the legs. If a large ant is so unfortunate as to run among the "crazy ants," he hastens to escape, but rarely does so without being severely bitten.

Common in Central Texas.

23. *Formica masonia*, n. sp.

*Worker.* Length 0.11 inch.—Color brownish-black, paler beneath; head cordate, with its upper surface subrotund; ocelli absent; eyes large, prominent and lateral, placed in the anterior portion of the head; occiput emarginate, with its posterior angles rounded; antennæ long, filiform; mandibles small and of nearly uniform width, curved inwards, with two teeth at the apex; under surface of head round, with a slight depression at the mentum and the occiput; prothorax about one-third narrower than the head, compressed and narrowed posteriorly, rounded and smooth above; mesothorax slightly depressed; pedicle short and inserted in the anterior portion of the base of the abdomen; scale small, subnodose; legs long, slender; whole ant smooth and glossy.

Female unknown.

Dwells in the ground near the surface, in the vicinity of Fort Mason, in Western Texas.

24. *Formica saxicola*, n. sp.

*Female*. Length 0.17 inch.—Head and abdomen subpiceous or brownish-black; thorax and legs reddish-brown; head small, triangular, about half the width of the thorax, rounded and smooth above; ocelli placed near the vertex; eyes large, placed about midway of the upper portion of the sides of the head; antennæ filiform and slightly enlarged towards the apical joint; mandibles small, flattened and narrower in the middle portion, curved inwards, and with four small teeth on the inner apical margin; thorax large, raised above the head, with the principal divisions slightly marked; pedicle short; scale small, erect and compressed; abdomen large, oblong-ovate; legs slender and rather short; whole ant smooth and shining; wings not seen.

*Worker*. Length 0.11 inch.—Color yellowish-brown; head triangular, wider than the thorax; eyes small; ocelli absent; mandibles small; thorax with the divisions strongly marked; mesothorax somewhat depressed; abdomen ovate; legs long and slender; legs and under surface of the whole body honey-yellow; otherwise like the female.

*Hab*.—Beneath rocks in Buchanan County in Northern Texas.

25. *Formica discolor*, n. sp.

*Female*. Length 0.30 inch.—Anterior wings extending about 0.10 inch beyond the abdomen, with one marginal and two submarginal cells, discoidal cells obsolete; head, thorax and legs reddish-brown, excepting the upper portion of the mesothorax which is black; abdomen black; eyes small, circular, black, lateral, placed near the upper surface, a little behind the middle part of the head; antennæ inserted in front, filiform; mandibles widened and curved inwards anteriorly, with their inner apical margins 5-toothed; head broader than the thorax, subquadrate, rounded above, a deep cavity beneath the occiput; prothorax raised above the head, rounded above; meso- and metathorax small, with the divisions well marked; pedicle short; scale large, vertical and compressed, with edges somewhat sharp; abdomen oblong-ovate, subobtuse, with a few scattering short hairs in the margins of the posterior segments; legs somewhat short and slender; tibiæ and tarsi of a darker shade than the coxæ and trochanters.

*Worker*. Length 0.26 inch.—Head thorax and legs reddish-brown; abdomen ovate, black; mandibles brownish-black; thorax compressed and narrowed posteriorly; prothorax about half the width of the head;

epistoma and posterior part of the abdomen somewhat hairy, the rest smooth and shining; legs long and slender; otherwise like the female.

Winged females caught about the middle of April. Dwell beneath stones and logs, having cells a few inches beneath the surface of the ground.

*Hab.*—Central Texas, where it is not very common, being rarely seen in the open air.

26. *Formica San Sabeana*, n. sp.

*Female.* Length 0.62 inch.—Wings extend but a little beyond the abdomen, and having one marginal and two submarginal cells, discoidal cells absent. Color: head and thorax black; abdomen yellowish-brown, the upper surface of the three last segments brownish-black; legs chestnut or yellowish-red; head subtriangular, depressed in front, vertex slightly convex; occiput emarginate, with the posterior angles rounded; eyes small, circular, and placed a little behind the middle of head on the upper margins of its sides; mandibles flattened, curved inwards, widened anteriorly, each with five teeth on their apical margins; antennæ filiform, and not enlarged towards the apical joints; prothorax large and of nearly equal width to the head, rounded above and raised higher than the mesothorax, a small depression between the meso- and metathorax; pedicel short; scale large, vertical and wedge-shaped; abdomen oblong-ovate; legs slender and short; whole ant smooth and shining, sprinkled with a very few short white hairs.

*Male.* Length 0.32 inch.—Abdomen very slender and oblong-ovate; color black, segments of abdomen hyaline; legs dark-brown or brownish-black; otherwise like the female. Caught in the winged state about the 1st of October.

*Worker.* Length 0.46 inch. Head black or brownish-black, triangular, about twice the width of the thorax; thorax yellowish-brown or piceous on its upper surface, its divisions strongly marked; otherwise like the female.

Found in an old decaying stump, in which it had many cells with intervening passages. Is very quick in its movements. Habits little known.

*Hab.*—Burnet and San Saba Counties, Texas. Rare.

27. *Formica fœtida*, n. sp.

*Female.* Length 0.19 inch.—Smooth throughout; honey-yellow, with brownish bands on the segments of the abdomen; head small, subtriangular, curved above and a little rounded beneath, concave be-

low the occiput which is slightly emarginate; eyes large, lateral, and placed in the anterior portion of the head; antennæ long, filiform; mandibles small, subtriangular, curved, and inner margins toothed near the apex; thorax wider than the head, compressed and narrowed posteriorly, divisions well marked, rounded and smooth above; pedicle short; scale small, vertical or slightly inclined forwards and obtuse; abdomen oblong-ovate, with the upper portion of the segments banded with reddish-brown, margins hyaline; last segment somewhat hairy; antennæ, upper part of the head and thorax sprinkled with short grey hairs; wings not seen.

*Worker.* Length 0.07 inch.—Head and thorax reddish-brown or yellowish-brown; abdomen honey-yellow, smooth throughout; head wider than the thorax; pedicle very short; scale small, and near the abdomen; eyes small; abdomen elliptical; the rest like the female.

Very active in its movements. Lives in the ground beneath stones, or excavates holes in open spaces, throwing its dirt crater-form; has many homes in the vicinity of each other. Lives principally on vegetable food. I have seen some seeds of weeds and grass in its cells beneath rocks, late in autumn. It is seen in the open air at all times during the day; has regular paths in the vicinity of its dwellings, along which it goes in single file, or in ranks; it is also seen frequently going up and down trees. It is not warlike, and is seen most in the vicinity of water near a river or stream. When touched it emits a very disagreeable odor, somewhat resembling rotten cocoanut, and very different from the formic-acid smell of some other species. I have often seen ten or twelve wingless females in one family beneath an upturned rock, and there were probably as many more in the cells below. These females were without any body-guard, nor does one seem to be needed when they are among friends. I have never seen the female ants receive any special attention from the workers, except when families are migrating or in times of danger; if a female becomes maimed then the workers rush to her assistance.

Common in Central Texas.

28. *Formica (Tapinoma) terricola*, n. sp.

*Female.* Length 0.27 inch.—Wings extending but little beyond the abdomen, with one marginal and two submarginal cells, discoidal cells obsolete; color black or brownish-black; under surface of head, thorax and abdomen and also the legs piceous, with lighter shades of yellowish-white; head small, triangular; eyes small, lateral, placed about midway of the upper surface of the head; mandibles small, curv-

ed inwards, and with three small teeth near the apex, which are not seen without a good lens; epistoma depressed; antennæ inserted in front, filiform; thorax wider than the head, rounded above, its divisions obscure; pedicle short, and inserted in the base of the abdomen a little in front of the middle; scale small, inclined forwards and wedge-shaped; abdomen large, broad-ovate; head, thorax and abdomen somewhat thickly sprinkled with short grey hairs; legs slender and of medium length.

*Male.* Length 0.08 inch.—Head a little wider than the thorax; abdomen ovate, small; otherwise like the female. Winged males and females captured in March.

*Worker.* Length 0.08 inch.—Color: upper surface of head, thorax and abdomen dark brown; under surface of the head, thorax and abdomen, also the pedicle, scale and legs pale yellow; head but little wider than the thorax; mesothorax depressed; abdomen ovate; otherwise like the female.

*Hab.*—Austin, Texas. Rare. Has cells in the ground near the surface. It is very active.

29. *Formica (Tapinoma) Wichita*, n. sp.

Length 0.10 inch.—Upper surface of head, thorax and abdomen jet-black and shining; legs, under surface of thorax, antennæ and mouth pale yellow; head broad-ovate, round above, at sides and behind, not emarginate; antennæ long, filiform, inserted at base of the clypeus; clypeus sub-curved, smooth; eyes rather large, prominent, sub-circular, lateral, placed about midway of the head; mandibles shorter than the labrum, very small, curved in and acute; under surface of the head not sinuate; prothorax one-third narrower than the head, round at sides, in front, above, and widest in the middle; mesothorax depressed, and a deep strangulation between it and the metathorax; metathorax widened and raised posteriorly, rounded above; pedicle inserted in the base of the abdomen a little in front of the middle; scale large, vertical, wedge-shaped; abdomen broad-ovate, obtuse; legs long; coxæ and trochanters large, a few scattering white hairs on the upper surface of the head and abdomen.

*Hab.*—Beneath stones near the Wichita River in Northern Texas.

30. *Formica (Hypochira) subspinosa*, n. sp.

*Worker.* Length 0.13 inch.—Yellowish-red; abdomen reddish-brown, smooth throughout; head sub-cordate, rounded above; occiput slightly emarginate, posterior angles rounded; eyes large, circular, placed a little in front of the middle on the upper surface of the round-

ed sides; antennæ long, clavate; mandibles small, slender, curved inwards, acute; head nearly twice the width of the prothorax, which is rounded in front, on the sides, and largest in the middle; mesothorax small, depressed or slightly strangled; metathorax raised, with two slight protuberances in front, truncate behind, with two rudimentary spines above on each side, and two below about midway of the sides; pedicle short, scale vertical, wedge-shaped; petiole inserted in the anterior basal part of the abdomen; abdomen ovate.

*Hab.*—Central Texas. Dwells in the ground beneath stones.

31. *Polyergus Texana*, n. sp.

*Female.* Length 0.17 inch.—Black, margins of the segments of the abdomen hyaline; head small, sub-quadrate, largest in front of the middle; clypeus large, raised, a depression between its base and the vertex of the head, eyes large, lateral, and placed in front; ocelli placed at top of the occiput which is elevated, its posterior angles rounded, convex beneath occiput and depressed below anteriorly; labrum large and porrect between the mandibles; mandibles small, projecting nearly straight, slightly curved downwards and inwards near the apex, toothless, acute and slender; antennæ inserted at base of the clypeus, filiform, short and not clavate; prothorax wider than the head, raised and rounded above; mesothorax higher than the prothorax; metathorax sub-truncate; pedicle short; scale small, nodose; abdomen oblong-ovate, sub-acute; wings extend beyond the abdomen about 0.08 inch; legs slender; head, thorax and abdomen sprinkled with a few gray hairs.

Found beneath limestone rocks in Buchanan County, Northern Texas.

32. *Ponera Texana*, n. sp.

*Worker.* Length 0.27 inch.—Dark reddish-brown, somewhat paler beneath; head sub-ovate, rounded above, occiput emarginate, its posterior angles slightly rounded; eyes large, circular, placed on the upper margins of the sides about midway of the head; antennæ inserted near the base of the clypeus with only a narrow ridge between their bases; a prolongation of the carina of the clypeus extend back to near the vertex; antennæ long, filiform, slightly enlarged towards their apical joints; mandibles long, enlarged, and widened in front, curved inwards and downwards, acute; head rounded beneath, with a small longitudinal stria through its centre; prothorax nearly as wide as the head, narrowed in front, widest in the middle, rounded above and at the sides; mesothorax small, somewhat depressed, depression deepest

between it and the metathorax; metathorax oblong, narrower than the prothorax, slightly compressed and enlarged posteriorly, and elevated, sub-truncate; node incrassate, enlarged posteriorly, then truncate; abdomen elongated, acute, with a small strangulation between the first and second segments.

*Hab.*—Archer County, Northern Texas, beneath red sandstones. Is rather thickly sprinkled with short hairs and is quick in its movements.

33. *Pomera amplinoda*, n. sp.

Length 0.29 inch.—Black or piceous; tibiæ, tarsi, mandibles and last segment of the abdomen piceous or reddish-brown; head quadrangular, somewhat rounded above and at the sides, not emarginate; antennæ inserted at the base of the clypeus, short, clavate; eyes small, circular, lateral, placed in front of the middle; mandibles large, cylindrical near their bases, then widened, triangular, acute, inner margins finely toothed, each alternate one largest; head somewhat flattened below; prothorax narrower than the head, rounded above and compressed at the sides, divisions of the thorax slightly marked, the whole being rounded above, compressed at the sides and narrowed posteriorly; scale incrassate, subquadrate, truncated before and behind, widened posteriorly; abdomen broad-ovate, and but slightly constricted between the first and second segments.

*Hab.*—Central Texas, beneath rocks. Rare.

34. *Ponera Pennsylvanica*, n. sp.

Length 0.12.—Upper surface of head, thorax and abdomen dark reddish-brown or piceous, mouth, last segment of the abdomen, legs and part of the under surface of the thorax pale yellow; head subtriangular, rounded above, occiput slightly emarginate; antennæ short, 12-jointed and much enlarged towards their apical joints; eyes none; mandibles large, subtriangular, toothed; under surface of head not sinuate; prothorax a little narrower than the head, rounded above, at sides and in front; mesothorax not depressed, and but little narrower than the prothorax; metathorax rounded at sides, narrower than prothorax, truncate; scale large, subquadrate, its posterior part highest; abdomen oblong, sub-cylindrical, acute, truncate in front, a strangulation between the first and second segments; whole ant nearly or quite destitute of hairs.

Dwells beneath stones in the vicinity of Philadelphia.



35. *Ponera elongata*, n. sp.

*Worker*.—Length 0.27 inch. Reddish-brown, some darker than others; head sub-triangular, rounded above and slightly so below, posterior part mostly straight when seen from above, with the corners slightly rounded; eyes black, and placed on the upper surface of the sides, a little in front of the middle of the head; mandibles sub-triangular, curved inwards and downwards, sharp-pointed; antennæ inserted in front near the epistoma, long, filiform and somewhat enlarged towards the apical joint; prothorax but little narrower than the head, rounded above and forwards; mesothorax small and strangled; metathorax longer than both pro- and mesothorax, compressed, enlarged and widest in the middle, terminating abruptly posteriorly; scale large, incrassate, subquadrate and oval above, occupying nearly the entire length of the pedicle, subtruncate at each end; a deep strangulation between the first and second segments of the abdomen; abdomen oblong-ovate, acute; legs long and slender; the insect is of slender form, and not active.

Found beneath limestone rocks, near Austin, Texas. I have never seen it at work in the open air. It is not common.

36. *Ponera (Ectatoma) Lincecumii*, n. sp.

*Worker*.—Length 0.15 inch. Upper surface of head and abdomen sub-piceous, the rest reddish-yellow or pale yellow; head oblong-ovate, rounded above, at sides and behind; eyes very large, prominent, lateral, elliptical, black; antennæ short, clavate and inserted on the sides of the clypeus; mandibles small, curved in and acute; inner surface not sinuate; prothorax one-third narrower than the head, rounded above, compressed at the sides, widest in front; mesothorax small, compressed and not depressed; metathorax a little wider than the mesothorax, sloping gradually to the pedicle, which is long; scale large, sub-nodose; abdomen oblong, sub-acute, a deep strangulation between the first and second segments; legs long, slender; whole ant smooth, shining, and of slender form.

*Hab*.—On trees in Central Texas. Is rather solitary in its habits, going here and there from branch to branch, seemingly without any definite object.

[TO BE CONTINUED.]

## NOTES ON THE ZYGÆNIDÆ OF CUBA.

BY AUG. R. GROTE.

Curator of Entomology, Buffalo Society of Natural Sciences.

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### PART I.

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The Family Zygænidæ, composed of those genera which oscillate between the Sphingidæ on the one hand, and the Bombycidæ on the other, has been characterized in a recent paper, in the Proceedings of the Essex Institute, by Dr. A. S. Packard, jr. The few genera from the Atlantic District, however, but feebly indicate its extent; it is when we consider the numerous inter-tropical forms proper to the New World, that we appreciate its value, and the family relationship of the genera of which the European genus *Zyggæna*, is the comprehensive type. Leaving the Castniaræ, *Boisd.*, of which I find but two genera represented in the present Collection of Cuban Lepidoptera, I but briefly refer here to the Zygæninæ, *Pack.*, to which group the main representation of the Family in Cuba is confined. In selecting the genera to inaugurate this subfamily, I have been led to regard those as the highest which, by their narrow form and vitreous wings, imitate the higher *Ægeriidæ*, and by receding from this type, I find that a very natural arrangement is effected, the genera become more closely scaled and broader winged, with often pectinated antennæ, and affording analogies with the Bombycidæ. Thus from *Horama*, *Hübner*, to *Melanohroia*, *Hübner*, there is a constant change in the analogical features of the genera, without any loss of affinity to a family type. In examining the structure of the genera, I am prepared to allow a high value to the conformation of the basal abdominal segment. In all the genera that I have examined, this ring is swelled laterally. In certain genera this is very prominently the case, as, for instance, in *Horama*, *Hübner*, and *Callicarus*, *Grote*. In these the protuberance assumes a valvular form, and the crust of the body is separated beneath, thus a tendency towards the formation of an accessory abdominal articulated appendage is developed, interesting in a homological point of view. In the higher genera it is also discolorous with the abdomen, and is thus a very

prominent feature in the ornamentation of the species. In the lower genera, this swelling is small and not always easy of apprehension, but I am led to believe in its existence in all the genera of the sub-family. Thus from its open and prominent appearance in *Horama*, to its most degradational expression, we have a fresh character for classification, and an additional aid in the arrangement of the genera. I am presently unacquainted with the function or the internal organization of this development. It is noticed cursorily by Guérin and Harris; the former, in his description of *Phyllœcia*, *Guérin*, says of it: "l'on voit chez les mâles à la base de l'abdomen, deux poches renflées, ouvertes en dessous et analogues a celles des cigales." I have not verified the sexual value of these lateral abdominal pouches, since they appear to me to be generally common to either sex, while the comparison made by M. Guérin with the Hemipterous *Cicada*, is original and full of interest.

In the present Collection I find a solitary species belonging to the Family *Ægeriidæ*, which latter, following the *Sphingidæ*, should precede the *Zygaenidæ* and *Bombycidæ*. The specimen is catalogued by Prof. Poey among the *Zygaenids* of the Collection, from which we can separate it by its peculiar family characters, and bears an etiquette with the number 467. To distinguish it from those genera of the *Zygæninæ*, which copy *Ægeria* \* in their vitreous and elongate wings, we look to the heavy globose thorax, which is extended in front for more than half its length before the insertion of the wings; to the narrow primaries with their parallel costal and internal margins, and to the cephalic characters of the *Ægeriidæ*, while the neururation is in this case indicative of its position, since it assumes a family type. Elsewhere, I have not found the neurational characters to be so positive as in the *Ægeriidæ*, and then they are rarely to be found useful as family characteristics, from a want of fixidity of type, which renders them comparatively useless in Groups above genera. Since the Cuban specimen is defective, I do not determine the species, which appears to me to be hitherto undescribed.

The genera *Callalucia*, † *Grote*, and *Eupsychoma*, ‡ *Grote*, from Colorado Territory, belong to the *Zygæninæ*.

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\* In refering *Cosmosoma omphale*, to the genus *Ægeria*, Say has overlooked these characters and classified the moth on its analogical resemblance.

† *C. vermiculata*, *Grote*.

‡ *E. geometrica*, *Grote*.

## Family ZYGÆNIDÆ.

## Sub-Family CASTNIARES, Boisduval.

**SEIROCASTNIA**, n. g.

The antennæ are very gradually swelled towards the tips, which are slenderer. Beneath, on their lower surfaces, the antennal joints are provided with a few minute and isolated setal hairs. The antennæ are thus simple, not serrate, and are much the same in either sex; in the male the lower surface is slightly more rugose. The antennal structure resembles that of *Alypia*. The eyes are prominent and globose. The head is plainly visible from above, but improminent, impacted on the prothoracic ring, which is straight and square in front; the insertion of the primaries being brought well forward. Clypeus, long, and clothed with loose and long scales, which leave the apex of a very prominent clypeal tubercle naked. Labial palpi, erect, not horizontally porrected, curved and pressed against the front, pilose, third joint obtuse and rather short. Thorax, square, flattened above; tegulæ moderate, clothed with broad, somewhat scintillate scales. Abdomen, tapering slightly, linear, as long as internal margin of the secondaries. In the male the corporal parts are more pilose, clothed with longer hair than in the female; the anal abdominal valves are pilose and prominent. In both sexes the thoracic parts are loosely haired; on the tegulæ the hairy squamation is underlaid by broader, shining scales. The wings are very ample, rounded at the angles; primaries elongate, since they are a third longer than the entire body. Nervules long and straight or somewhat depressed. First, second and third m. nervules approximate and equidistant at base. The nervules are longer than in *Alypia*, since the whole wing is proportionally more elongated. The costal nervules are more aggregated. Secondaries, full and rounded; their neuration resembling that of *Alypia*. Legs, stout, spinose, generally finely scaled; tibial spurs, especially those on the hind legs, long. Tibiæ, fringed laterally with longer hairs, especially in the male. Maxillæ, moderate.

This genus cannot be referred to Ephialtias, *Hübner*, of which *E. abrupta* is the type. In the diagnosis I have endeavored to bring out the evident affinities of the moth to *Alypia*, and its proper location in this sub-family. *S. tribuna* is called *Josia tribuna* by Mr. Walker. It is evident that the material cited under *Josia*, *Hübner*, by Mr. Walker, belongs to several distinct genera, for which the names employed to distinguish groups in the British Museum Lists might be used. I cannot, however, use the name "*Thyrgia*," under which Mr.

Walker has placed *S. tribuna*, for the reason that the brief diagnosis does not agree with our species, with which Mr. Walker is autoptically unacquainted, but probably with *Epidesma milita*, *Hübner*, cited first under the group.

*Seirocastnia tribuna*.

*Ephialtias tribuna*, *Hübner*, *Zutr.* 3rd Hund. p. 24, No. 246, figs. 491—492. (1825.)

*Josia tribuna*, *Walker*, *C. B. M. Lep.* Pt. 2, p. 317. (1854.)

Deep brown, with a light purplish iridescence. Primaries with a basal longitudinal stripe of yellow scales, extending above and along the median nervure to base of 4th m. nervule. An oblique, broad, slightly sinuate band, of the same shade, runs across the wing, extending from within apical half on the costa, to external margin above the angle, without attaining either margin. Secondaries with a very broad median longitudinal band of a richer, darker yellow than the stripes on the primaries, extending from the base and spreading wider over the disc and middle of the wing.

Under surface, resembling upper; on the primaries the basal stripe is wider and more diffuse than its analogue on the upper surface, while the color of both bands is darker and like that on the secondaries.

Head, clothed with mixed brownish scales; palpi, yellow, except the apical joint. Prothorax, with a yellow band. Thorax, clothed with brownish scales. Abdomen, yellow, with a dorsal longitudinal black stripe; beneath, with a broader black ventral stripe; anal valves, in the male, clothed with blackish hair. Legs, blackish; middle and hind tibiæ with an outward lateral yellow stripe. Exp. ♂, 1.85. ♀, 2.15 inches. Length of body, ♂, .80, ♀, .85 inch.

*Habitat*.—Cuba, (Poey). *Coll. Ent. Soc. Philad.*

*Number 163, Poey's MS. Catalogue.*

#### **EUSCIRRHOPTERUS**, n. g.

A genus allied to *Eudryas*, and plainly showing the position of the latter in this sub-family. It is also allied to *Hecatesia* and *Ogcocera*. The sexes are quite dissimilar in structure and appearance. This character in the present instance leads me to surmise that *Hecatesia*, as illustrated by Dr. Boisduval, is merely founded in the male sex. Our genus, though allied, seems quite distinct from these two Asiatic genera. Under the name "*Eudryina*,"\* I have indicated a group which would contain all these genera, but, since recognizing the Family *Zygaenidæ* as here presented, I think the retention of the term unnecessary.

\* *Proc. Ent. Soc. Phil.*, June, 1863, p. 65, in an article describing *Ciris Wilsonii*, (*Eudryas Wilsonii* Grote.)

Head, very large and prominent; eyes, full, larger in the male than in the female; clypeus narrow. In both sexes the loosely haired palpi are held horizontally, exceeding the front, third article minute. In the female the second palpal article is fringed with rigid hairs, extending forwards beyond the third article, which is held somewhat re-curved. Maxillæ, well developed. "Front," loosely scaled in the male, the squamation surrounding and rising in a ridge above the exposed apex of the well developed clypeal tubercle. In the female the squamation is smoother and leaves the clypeal tubercle well exposed. The clypeus narrows above towards its posterior edge in the male, rounding anteriorly; in the female it is squarer, its sides being parallel. The thorax is stout and broad, loosely and coarsely haired. The abdomen is destitute of tufts, as is the thoracic disc, and is a little longer than the internal margin of the secondaries. Legs, stout and spinose; in the male the middle and hind tarsi are fringed with long hair, absent in the opposite sex.

Wings shaped much as in *Eudryas*; in the male they are shorter, roundedly exserted on costa at apical third, and the neuriation is peculiar and aberrant. There is a stout marginal nervure. A straight



Anterior wing of ♂ *Euscirrhopterus*, enlarged.

costal nervure joins the costa before the apical enlargement, the first sub-costal nervule is thrown off on the upper side of the nervure, at about its centre, and runs continuous with, and closely approximate to the costal nervure, extending beyond the latter, and joining the costa at immediately before, or at the inception of the apical curvature. The second and third s. c. nervules are thrown off together at the extremity of the nervure; the second being curved upwards, running approximate to costal curvature; the third, continuous with the main nervure, which is here curved upwards, and joining the margin at before the real apex of the wing or that point which is outermost and which is attained by the fourth s. c. nervule. The fifth s. c. is thrown off at a point on the discal cross-vein, slightly removed from the nervure itself. The sixth, on the lower side of the nervure, is thrown off at a point about half way between the first and fourth sub-costal nervules, and, by intersecting the discal cross-vein at right angles, encloses a small sub-costal triangular cell, having its reversed apex at this juncture. Both the fifth and sixth s. c. nervules are flexuous and sinuous in their course.\* The

\* In the accompanying diagram, otherwise correct, the fourth s. c. nervule is by error also represented as sinuous.

discal cell itself, is closed. The median nervure throws off first, second, third and fourth m. nervules very much as in *Eudryas*. A comparison of the entire nervulation in both sexes of *Euscirrhopterus*, with that of *Eudryas*, shows the affinity of the two genera. The neururation of the secondaries is almost identical with that of *Eudryas*.

In the female, the anterior wings are straight along the entire costal length, more elongate and pointed than in the male, while the neururation is normal, so to speak. The second s. c. nervule is straight, not curved as in the male; the second, third and fourth s. c. nervules running approximate and being similar in their course. This is caused by the absence of the apical enlargement. The neururation of the secondaries is identical with that in the male, but these are larger.

The ♂ antennæ are simple, slightly scaled on their upper surfaces and swelled towards their tips. The ♀ antennæ seem a little longer and are linear, being nowhere thickened throughout their length. In both sexes they are rather stout and, especially in the female, semi-annulate, reminding us somewhat of the antennæ of *Lycænidæ*. The genus is, I think, higher than *Eudryas*, though the structural sexual dissimilarity may be assumed as a degradational character.

***Euscirrhopterus Poeyi*, n. sp.**

The male is darker than the female. The primaries are clothed with rough, mixed brownish and pale scales, which are sparsely laid on along the disc and on the inferior external parts. The internal margin, until before the angle, and the apex, are clothed with darker and closer, thicker scales. A large dark spot at the extremity of the disc. Two geminate, transverse, demi-bands, with pale internal scales, on internal margin. These are angulated and wide apart. The secondaries are similarly colored with the primaries, but the scales are very thinly laid on, especially centrally. A dark shade along external margin, widening toward anal angle, where are some terminal, paler brown marks. Internal margin fringed and covered with long ochreous-yellow hair; fringes whitish. Abdomen, ochreous-yellow. The female ornamentation, while much the same as that of the male, more plainly recalls the ornamentation of *Eudryas*. The scales are evenly and closely laid on. The primaries are covered with mixed brownish and pale scales along costal margin, and broadly so along external and internal margins. The center of the wing, from just beyond extreme base to end of discal cell, is covered with a white stripe, widening as it proceeds. At the extremity of the disc, it is interrupted by a large, oblique, dark discal spot, margined on both sides by dark sinuate lines, which meet below, but are discontinued superiorly, where the discal spot is merged with

the dark costal scales without separation. Beyond the disc, the white scales again obtain and extend narrowly to costa, which they reach just before the apex. These white central patches are margined inferiorly by a dark line and a diffuse obscure olivaceous shade, which latter also clouds the discal spot. Two geminate demi-bands, widely separate, as in the male, and shaded broadly outwardly, by a continuation of the obscure olivaceous tint, which, deepening the color of the wing centrally, leaves the margins paler.

Secondaries, very pale yellow, much paler than in *Eudryas*, with a distinct, even, rather broad and dark brown band along external margin, and which encloses, before anal angle, some paler brown marks, as in the male; a terminal darker line; fringes whitish. Beneath, the wings are largely pale yellow, the color of the upper surface of the secondaries, and have powdery brown margins; on the primaries, a discal mark.

Thorax, colored much as in the male; head, above, clothed with pale scales, which are somewhat whitish. Legs, brownish, slightly fringed with whitish hairs; anterior tibiæ outwardly spotted with black; all the tarsi semi-annulated. Abdomen, concolorous with secondaries, paler beneath, on basal segments two dorsal blackish marks. In the male, the under surface of the wings resembles the upper surface, with obsolete ornamentation. The under thoracic surface and legs are clothed with rough, mixed brownish hair. As in the female, the anterior tibiæ are spotted with black. Exp. ♂, 1.60, ♀, 1.80 inch. Length of body, ♂ and ♀, 0.75 inch.

*Habitat*.—Cuba (Poey.) Coll. Ent. Soc. Philad.

*Number* 337, *Poey's MS. Catalogue*.

The structural dissimilarity between the sexes of *Euscirrhopterus* Poeyi, reminds us of *Psychonoctua personalis*, *Grote*, in the *Bombycidae*, and *Heliocheilus paradoxus*, *Grote*, in the *Noctuidæ*.

I dedicate this interesting species to Prof. Felipe Poey, whose "Centurie des Lepidoptères de L'île de Cuba," is a most conscientious addition to our knowledge of West Indian Lepidoptera.

Sub-Family ZYGÆNINÆ, Packard.

**HORAMA**, Hübner.

This genus, transcribed as "*Horamia*," by Mr. Walker, in the *Brit. Mus. Lists*, is established, in the "Verzeichniss," on a single species, *Sphinx Pretus*, Cramer, Vol. 2, p. 121, plate 175, figs. E, F. Subsequently, Hübner refigured the species on one of the Plates belonging to an incomplete third volume of his "Sammlung Exotischer Schmet-



terlinge," giving as the locality for his *H. Pretus*, the West Indian Island of St. Thomas; a habitat also given by Cramer for his figure F, which latter differs from the figure E, by its paler color, Cramer stating it to be the male of the species. Hübner does not verify this sexual difference in his figures, which I believe to represent the same species as that intended by Cramer; it thus eventuates that either Cramer's figure "F" is an accidental variety, or not the true ♂ of his first figure "E," which latter sufficiently corresponds with the figures of both sexes of *Horama Pretus*, Hübner. Following out my reference of the species cited by Mr. Walker under the genera "*Glaucopsis*," and "*Euchromia*," as affording types of many distinct genera, it is necessary to fix those erected by Hübner, and which have been neglected by subsequent lepidopterists, I think to the detriment of the proper comprehension of the structural peculiarities of these very interesting insects. In selecting, from the present Collection, those genera which most palpably copy the *Ægeriidae*, to inaugurate the typical sub-family, *Zygæninæ*, the choice of the genus *Horama*, seems compulsory.

*Phyllocia*, Guérin,\* may be assumed as a synonym of this genus, since the diagnosis sufficiently corresponds and, moreover, *Horama pretus*, Hübner, is referred as belonging to the new genus. Nevertheless the name proposed by Guérin may be used for this Author's *P. punctata*, should this species be found generically distinct from the species of *Horama*. *Mastigocera*, Harris,† is evidently identical with the present genus, and is based upon *Horama vespina* (*Mastigocera vespina*, Harris), apparently a parallel species with *H. pretus*, and from the same locality—St. Thomas, W. I.

The antennæ are inflated beyond their middle, being compressedly widened, thence tapering to their tips; the articulations are provided with setal hairs and are very distinct, owing to the thickening of the anterior margin of each antennal joint. Labial palpi, pressed against the front, exceeding slightly the clypeus. Maxillæ, well developed. Wings, long and narrow; secondaries, reduced. Legs, well developed; anterior tibiæ provided with a row of spinules on their under surface; posterior tibiæ, at their terminal extremity, and posterior tarsi, clothed with lateral compressed scales, which give these parts a flattened appearance. Abdomen, cylindrical, tapering; the lateral pouches on the

\* Iconographie du Règne Animal de G. Cuvier, etc., par M. E. F. Guérin Meunville, 1829—1838. Insects, p. 504.

† Catalogue of North American Spingies, Silliman's Journal, Vol. 36, 1839, p. 315.

first segment well developed and inflated, open beneath. The wings are opaque in this genus and the species are soft brown and yellowish in color.

*Horama difflusa*, n. sp.

Palpi, yellow; second joint clothed with mixed white and yellow scales. The narrow epicranium is covered with dark brownish scales which, when magnified, show a purple gloss. This scale patch is fringed anteriorly by a few pale yellowish scales, which depend over the clypeus below the antennal insertion. Ocelli, rather prominent, of a clear yellow glassy color when viewed enlarged. Clypeus, in all my specimens, deprived of scales, the dark brownish tegument being naked. Antennæ, ochreous, stained with brownish-black beyond their middle, at their point of distension; tips, dusky. The prominent "collar" is pale yellow. Thorax and tegulæ, covered with dusky brown scales. Basal, or first abdominal, segment much distended, above covered with white, short, close scales, which are interrupted centrally on the "pouches" by clear yellow scale patches. Second and third segments very dark brown above, with a dorsal yellow maculation on their anterior margin and larger yellow spots laterally. Terminal segments paler brown. Beneath are two lateral yellow spots at the base of the second and hind pair of legs. Basal abdominal segments whitish beneath. Legs, dark brown; coxæ, yellow; tarsi, dusky ochreous.

Anterior wings of a rich soft brown color, immaculate, with a faint yellowish or brighter tinge which, on the under surface, suffuses the wings at base and along internal margin. Posterior wings, largely bright ochreous yellow, with a dark-brown apical patch, below this latter the dark-brown scales form an incomplete border along the external margin. Under surface of secondaries, resembling upper surface.

Two male and one female specimens, the latter with paler yellow secondaries, which want the brighter tint of the ♂ on their upper surfaces. Exp., ♂ and ♀, 1.40 to 1.60 inch. Length of body, ♂, 0.50 inch.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Philad.

*Number* 186, *Poey's MS. Catalogue*.

This species may be at once distinguished from *H. Pretus*, *Hüb.*, by its largely ochreous yellow secondaries and narrower wings. The female specimen is probably faded.

**CALLICARUS**, n. g.

The antennæ are sub-serrate, gradually swelled towards their tips, which are slenderer and flexuous. The labial palpi are held freer and more greatly exceed the "front" than in *Horama*. The head is smaller and the prothoracic pieces are narrower than in *Horama*. Wings, narrow, proportionally shorter than in its ally; primaries widening rather suddenly towards their external margin, which latter is rounded and less oblique than usual. Nervules short; 3rd and 4th median nervules more widely separated at base than in *Horama*. Legs, long and finely scaled; middle tibiæ with minute apical spurs; posterior pair largely developed, with a thick brush of long hair fringing either side of the lower half of the tibiæ and upper part of the tarsi.

*C. plumipes* (*Sphinx plumipes*, Drury, Exot. Vol. II, Plate 27, fig. 3,) belongs to this genus, which may be distinguished from *Horama* by the differing antennæ, reduced prothoracic pieces and the differently shaped primaries. The neurulation seems to me to be quite distinct, but I have only a single individual before me, and cannot fully enter into the comparative details, owing to my desire to keep the specimen intact.

The beautiful species of this genus are black or blackish, with exaggeratedly tufted posterior legs, reminding us of the antennal ornamentations of certain Coleopterous insects belonging to the Family Cerambycidae.

***Callicarus pennipes***, n. s.

Black. Wings, obscure blackish, immaculate. Primaries with a few basal whitish scales; longitudinally, along the centre of the wing from the base to the fourth median nervule, the wings are narrowly sub-diaphanous; beyond, above the median nervure, the tegument is for a narrow space entirely deprived of scales, and similarly and more prominently so at the base of the interspaces between the second and fourth m. nervules; the veins being covered with blackish scales. Secondaries, obscure black, with a central, longitudinal, sub-diaphanous streak. Under surface, resembling upper; the primaries show a narrow sub-costal whitish line, extending from the base of the wing for about half of its length, and becoming gradually obsolete. Secondaries with two or three faint, parallel, sub-costal, whitish lines; the very narrow fringes are whitish.

Head, blackish. The eyes are narrowly bordered on the front with white scales, which expand before the antennal insertion into lateral white dots, and there is a third, centrally covering the space between

the antennæ. Behind, the eyes are more prominently bordered with bright orange or gold-colored scales. Prothorax, blackish, with two central and lateral white dots. Beyond the insertion of the primaries, are lateral gold-colored spots, and centrally, behind the central white prothoracic dots, are a few similarly colored scales. Patagia, blackish; prominently lined within by white scales. Thoracic disc, blackish, behind and centrally with a few yellowish and whitish scales. Abdomen, above, blackish; the lateral pouches on the basal segment are white, with a large orange-yellow spot on their inner margin. The four basal abdominal segments show each a dorsal white dot on their anterior margins; the terminal segments show faint traces of these dots, though much reduced and obsolete.

Beneath: the palpi are white, except at their tips, which are blackish. Three lateral golden-yellow spots at the base of the legs on each side. Legs, blackish; coxæ, whitish; anterior and middle tibiæ streaked with whitish on their inward surfaces; posterior tibiæ whitish at their middle, beyond which they are blackish, and strongly fringed with black hair, which latter extends over the basal half of the tarsi; terminally the hind tarsi are whitish, concolorous with the tibiæ above the black hair tuft. Under surface of abdomen, white. A lateral row of white dots, of which those on the second, third and fourth abdominal segments, beyond the lateral pouches, are largest, and immediately beneath the two first are golden-yellow spots. Antennæ, blackish. Exp. ♂ 1.00 inch. Length of body, 0.50 inch.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc. Philad.

*Number* 1004, *Poey's MS. Catalogue.*

The Cuban species may be readily distinguished from *CALLICARUS PLUMIPES*, by its smaller size and slenderer shape, as well as by the diaphanous spaces on the wings and the golden-yellow corporal spots. The habitat of Drury's species is given as the Bay of Honduras. It is very evident on comparing the description of *Euchromia plumipes*, *Clemens*, Proc. Acad. Nat. Sci., Phil., p. 546, (1860), that this species from Texas totally disagrees with the figure and description given by Drury, which reads as follows:—

"*Upper side.*—The antennæ are black, but whitish at their extremities, being thickest in the middle. The head is black, with a white spot in front between the antennæ. The neck is black, with three white spots on it. The Thorax is black, with several white spots thereon. The Abdomen is also black, with several narrow white rings. All the wings are dark-brown, without any spots or marks of any kind on

them. *Under side*.—The palpi are white.—The Tongue is curled up within them. The Breast is black, being spotted with white on its side. The Abdomen likewise black, having one broad white ring on it, and several narrow ones. The legs above and below these tufts are white. All the wings are the same color as on the upper side. I received it from the Bay of Honduras."

From this description and the accompanying figure it is clear that *C. plumipes* is a large dark species, with unicolorously dark wings, spotted thorax and ringed abdomen, and without any yellow or orange spots, which, as in *C. pennipes*, are described as characterizing Dr. Clemens' Texan specimens. These then evidently form a third species of the genus which may be called:

***Callicarus texanus*, n. s.**

*Euchromia plumipes*, Clemens, (nec. Drury), Proc. A. N. S., Phil., p. 546. (1860).

"Blackish, somewhat tinged with blue. Antennæ with ochreous tips. Face yellow, with a blackish central stripe, and a yellow spot between the antennæ. Thorax with four yellow spots, and tegulæ striped with yellow on the inner edge. Abdomen, with tip dark-yellow, and banded with the same hue between the segments; the two segments next the basal banded with white beneath. Wings, concolorous dark-brown, immaculate. The fore coxæ each with an orange-yellow spot; legs, black, middle femora striped with dark yellow; hind tibiæ and tarsi with yellow hairs, broadly banded at the end of each with black."

"Texas. Coll. Capt. Pope. Smithsonian Institution."

Except in the immaculate wings, *C. texanus* is evidently broadly distinct in every particular from *C. plumipes*, and differs in the former particular from *C. pennipes*, as well as by the yellow face, banded abdomen, etc., etc. No measurements are given by Dr. Clemens of his specimens. Under the name "*Euchromia*," Group "*Horamia*," a good diagnosis is however given of the present genus—*Callicarus*, so that I see that all these species are correctly associated.

**FORMICULUS, n. g.**

The antennæ are massive, serrate and comparatively short. The terminal articles appear slightly swelled, so that the antennæ may be said to be sub-capitate, terminating bluntly. Form exceedingly slight and narrow. Head, free, small. Caputal tegument piceous, glabrous. In neither of my specimens do I detect the presence of the labial palpi. Maxillæ, short. Legs, short, finely scaled; posterior pair hardly longer than the rest, without tibial spurs.

Primaries nearly half as long again as the entire body; nervules straight, equidistant; a lower, narrow, linear cell below the median, formed by a vein arising from what is at first a mere longitudinal fold. Four median or lower nervules. Three superior nervules, of which the second and third arise near together at base. Internal nervure arcuate.

I erect this genus for a species, so far as I am aware, one of the smallest of its family, and of a much narrower shape than *Harrisina Sanborni*, *Packard*, a species structurally widely separated from the present.

***Formiculus pygmæus*, n. sp.**

Blackish; thinly covered with scales. Front with a few whitish scales. Abdomen, above, with dark cyaneous scales. Wings, narrow; centrally, below and above the median nervure, narrowly diaphanous; an entirely clear, rounded patch at the extremity of the disc. Secondaries reduced, narrow, blackish; a central clear spot preceded by a linear, sub-diaphanous streak. Under surface resembling upper. Legs and under corporal surface, blackish, the former a little the palest. Exp. 0.65 to .70 inch. Length of body, 0.35 inch.

*Habitat*.—Cuba (Poey). Coll. Ent. Soc. Phil.

*Number* 127, *Poey's MS. Catalogue*.

In the free head, serrated antennæ (which are however stouter and shorter), and elongate wings, this singular genus resembles *Callicarus*. The smaller posterior legs ally it to the succeeding genera. The neuuration of these narrow winged Zygænid genera reminds us of the *Egeriidæ*. The dark tegument and sub-cyaneous abdominal scales of *Formiculus* are characteristics of its Family. The non-petiolated abdomen, among other characters, will distinguish *Formiculus* from *Pseudosphex*, *Hübner*.

***BURTIA*, n. g.**

Antennæ (♂) moderate, closely bi-pectinate to their tips. Palpi, small, porrect, hardly exceeding the front. Head, broad behind; prothoracic pieces, prominent. Body, slender, linear; abdomen, long and narrow, closely scaled; genitals (♂) very prominent and exposed, consisting of a prominent, superior, forcipated piece, and two very elongate, inferior, lateral, corneous pieces, all of which are lengthily hirsute.

Wings, comparatively short and wide. Primaries, greatly larger than secondaries; rounded at the apices; external margin roundedly oblique; internal margin straight, short. Subcostal nervure, except at extreme base, running contiguous and parallel with costa, furrowed

on the upper side so as to form a parallel narrower ridge. A weak veinlet, which I regard as the first sub-costal nervule, is thrown off at apical third on costa, beyond the discal cross-vein on the opposite side. Before the apex, the sub-costal nervure furcates; the upper branch again very shortly dividing and forming the 2nd and 3rd s. c. nervules; the lower branch, or 4th sub-costal nervule, runs straightly and downwardly obliquely, to external margin. Four median nervules; discal cell closed. First and second m. nervules arising near together; third farther removed, and fourth still more so. Internal nervure nearly straight. Discal fold, obsolete. Secondaries, much reduced; nervules, short; discal cell, large, entirely closed. Four median nervules which arise at gradually increasing distances, and are somewhat curved.

Legs, finely scaled, unarmed; posterior pair not unusually longer than the rest.

This genus, which I fail to detect as already noticed by Authors, is founded upon a small species with diaphanous wings, and allied to the species I mention below, under *Eunomia*, *Hüb.* It differs from that genus structurally in the smaller palpi, the linear corporal parts, and the peculiar development of the ♂ genital appendages. In a single female specimen the abdomen is shorter than in the male, and terminates bluntly. Judging from this single ♀ *Burtia*, that I have before me, the ♀ antennæ are impectinate or more simple than in the ♂. These are, however, so broken in the present instance, that I cannot state the fact with certainty.

***Burtia rubella*, n. s.**

Sanguineous. Primaries, largely vitreous; extreme base sanguineous. Costal edge narrowly dull-brown, as is the internal margin. An aggregation of dark scales about the discal cross-vein, forming an elongate discal spot, fused above with the costal scales. Terminally the wing is covered with dull brown scales, forming a band widest at the apex, narrowing to internal angle very rapidly. Two prominent sanguineous spots, situate sub-apically on the interspaces, divided by the fourth sub-costal nervule. Under surface, resembling upper.

Secondaries, largely diaphanous, with a narrow, terminal, dark-brown irregular band, distended at apex, and fringed towards anal angle and partially along internal margin with sanguineous hairs. Under surface, resembling upper.

Clypeus, covered with brownish, close scales; palpi, whitish beneath, brown at the tips and above, basal joints sanguineous. Head, behind, "collar" and prothorax, sanguineous. Patagia and thoracic disc, dark

brown, with narrow, whitish, distinct lines. Abdomen, sanguineous; beneath, centrally, with whitish scales; genital appendages clothed with long, dark-brown hair. Legs, pale-brownish, shaded with whitish outwardly; anterior femora, whitish on their superior surface. Under thoracic parts, brownish, except laterally, immediately below the insertion of the wings, where they are covered with sanguineous scales.

The single female specimen resembles the males in coloration, except that the under abdominal surface is covered with brown scales not sanguineous, and in the absence of all whitish shades in the under corporal parts. The brown caudal appendages are here wanting, so that the female abdomen presents a quite different appearance from that of the male. In either sex the diaphanous portion of the wings presents, in certain lights, a faint pale-blue reflection. Exp., ♂ ♀, 0.90 inch. Length of body, ♂, 0.45, ♀, 0.35 inch.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc., Philad.

*Number* 595, *Poey's MS. Catalogue.*

To my dear friend, Harry D. W. Burt, of New York City, I dedicate this exquisite little genus.

#### **EUNOMIA**, Hübner.

Antennæ, rather long, closely plumose in the male; in the female the pectinations are much shorter, decreasing to the antennal base, which is simple. Terminally, the antennæ in either sex are reflected and pointed. Head, small, narrowed behind. Palpi, prominent, porrect, third article exceeding the front, slender, closely scaled. Prothoracic pieces narrow; thorax, globose, stout, shortly and finely scaled, as are all the corporal parts in this genus, being evenly dusted with squammæ without hirsuties. Abdomen, plump, short, and rather obtuse in either sex; a little slenderer and more tapering in the male.

Primaries, large and mostly vitreous, or free from scales. Costa, a little depressed at about the middle; apices moderately produced; external margin roundedly oblique, slightly excavate before internal angle; internal margin short. A prominent discal fold, running longitudinally and dividing the discal cell, beyond which it borders the first median nervule, joining the external margin at the extremity of the 4th sub-costal nervure. This fold arises at a little before the middle of the cell, at a point about the inception of the 4th m. nervule. Interspaces, wide; nervules, divergent. Secondaries, reduced, narrow, rounded at the apices, excavate along external margin. Legs, slender and finely scaled; armature, feebly developed.

The coloration of this genus is black, with scarlet abdominal valves,



and scarlet scales on the under surface of abdomen, and laterally on the legs, and with neat corporal white lines. The wings are clear, with broad, distinct, black borders along the external and internal margins.

The *Læmocharis fasciatella*, *Ménetriès*, from Brazil, seems to belong to this genus, while it differs by its slenderer body and more acute wings.

***Eunomia insularis*, n. s.**

Head, clothed with dull blackish scales; eyes, narrowly margined behind with white scales; some white scales on the vertex in front of the antennæ, and also a few behind, forming a central spot. Prothoracic pieces, dull black, neatly margined with white. Thorax, dull black; a longitudinal, narrow, white line, crossed at right angles by the narrow white edging of the metathorax. Tegulæ, narrowly lined with white. Abdomen, dull black; first segment, with the abdominal pouches intense red or dark scarlet, which color extends across the segment superiorly, which, elsewhere, dorsally is white, with two lateral, black, arcuate lines. The remaining segments are narrowly edged with white posteriorly; the second and fourth are more broadly banded laterally with white. Beneath, the palpi are whitish; prothorax and anterior femora, white; the thoracic surface is covered with scarlet scales, which extend over the coxæ and on the outside of the hind femora, as well as over the first abdominal segment; legs, dull blackish, shaded with whitish; abdomen, dull blackish in the ♀, in the ♂, striped with white, except on the anal segments. Antennæ, blackish.

Wings, vitreous, having in certain lights a pale blue reflection. Costa of primaries covered with blackish scales; a square, black, terminate, discal blotch. Terminally, a broad black border, widest at apices, thence constricting rapidly towards internal angle. Along the internal margin, the space below the s. m. nervure is filled in with blackish scales, except for a narrow portion, immediately below the vein centrally. Costa of secondaries with pale whitish scales. A broad, black, terminal border, widest at apex and anal angle, and extending along internal margin to base of the wing. Under surface, resembling upper. Exp. ♂ ♀, 1.10 to 1.20 inch. Length of body, 0.45 inch,

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Philad.

*Number* 143, *Poey's MS. Catalogue*.

*Eunomia columbina*, *Hübner*, *Zutr.* 1, *Hund.*, figs 9—10 appears to be nearly allied to *E. insularis*, and to be congenerical. *E. columbina*, *Fabr. sp.*, is the type of Hübner's genus in the "*Verzeichniss*."

**COSMOSOMA**, Hübner.**Cosmosoma omphale.**

*Cosmosoma omphale*, Hübner, Samml. Ex. Sch. Vol. 2, Lep. II, Sph. I, Pap. III, Glauc. D, Hyal. 3. figs. 1—4. (1806.)

*Ægeria omphale*, Say, Am. Entom. Vol. 2, p. 42, Pl. 19, lower figure. (1825.)  
Id. ed. Lec. (1859.)

*Glaucopsis (Cosmosoma) omphale*, Harris, Cat. N. A. Sph. Sill. Journ. Vol. 36, p. 317. (1839.)

*Glaucopsis omphale*, Walker, C. B. M. Part I, p. 168. (1854.)

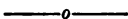
*Cosmosoma omphale*, Clemens, Proc. Acad. N. S. Phil. p. 544. (1860.)

The specimens from Cuba agree with Hübner's and Say's figures. I have also received specimens of this species from Mexico. Say, Harris and Walker record their material of *C. omphale* from Florida. In addition, Dr. Clemens gives "Mexico, near Jalapa." The validity of the genus *Cosmosoma* seems to me indisputable, and Dr. Clemens (loc. cit.) has given a thorough diagnosis of its characters.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 132, *Poey's MS. Catalogue.*

Under the Number 521, and with the determination "*Læmocharis selecta*," Prof. Poey sends several specimens of a species which differs structurally from *Cosmosoma*, by the absence of the discal fold of the primaries, but is otherwise closely allied to that genus. The species is variable, judging from this material, and none of the specimens accurately agree with Dr. Herrich-Schæffer's figure (Exot. Sch. fig. 256) under this specific name. In the present arrangement of the Cuban genera, this form should precede *Cosmosoma*, following *Eunomia*. For the moment, I leave these specimens undetermined.

**Descriptions of some New Species of Pselaphidæ.**

BY EMIL BRENDEL, M. D.

**FUSTIGER** Lec., n. gen.

The description of the genus *Articerus* shows us an insect of the family of *Clavigeridæ* differing from *Claviger* by having eyes, and the antennæ consisting of but one joint, and even that joint was said to stick in the head without any articulation. Subsequently, several species of *Articerus* were described, which have not only a true articulation, but even two joints. These are *A. braziliensis*, *A. syriacus*, and a new species from East Tennessee. As all these do not agree with the original *Articerus*, it was right to define them more properly. Accordingly Dr. John L. LeConte separated the genus *Fustiger* from *Articerus*.

The new species from Tennessee is

1. *Fastiger Fuchsi*, n. sp.—Testaceus, translucens, variolatus, pubescens, capite obconato, antennis 2-articulatis in fossa magna sub frontis margine insertis, articulo secundo obconico, oculis parvis lateraliter insertis, ocellis binis in occipite dispositis. Thorace rotundato, variolato, elytris truncatis, abdomine fovea magna ad basin impresso. Long. 2.0 m. m.

The stature of this insect resembles most that of *Adranes coecus* Lec. The head is conical, widest between the eyes; the front is slightly impressed in the middle; the antennæ are inserted in large grooves below the lateral margins of the front, which extend to the middle of the face, leaving only a small ridge running from the clypeus to the frontal impression; the vertex is variolate, thinly pubescent; the eyes are situated laterally near the base and consist of but eight facets; on the occiput are two ocelli consisting of but three small facets. The antennæ are 2-jointed, the first joint small, cylindrical, of equal dimensions, the second is obconical,  $1\frac{1}{2}$  times as long as the head, and at the end four times as wide as at the base, consisting of six false connate joints. The maxillary palpi are apparently two-jointed. The thorax is rounded, not longer than wide, variolate, pubescent, slightly depressed above, with a variolate scar at the base. The elytra are a little truncate at the posterior, exterior angles, variolate, pubescent, the sutural striæ distinct. The abdomen consists of three dorsal and five ventral segments; the first dorsal segment is very large and has a deep groove at the base, extending from side to side, in the depth of which are the coxal articulations shining through; behind the groove the segment is convex, smooth, thinly pubescent. The margin of the first segment is broad and shows beautiful convolutions and folds near the base. The anterior coxæ are conical, the intermediate more globose, the posterior transverse; the trochanters are half as long as the femur, the tibiæ are strongly pubescent; the tarsi are two-jointed and have but one claw.

This specimen seems to be a female. It was presented to me by Mr. Henry Ulke, and was discovered by Mr. Fuchs, of East Tennessee, to whose honor and for instigating him to work more in that line, it was named after him.

2. *Otenistes monilicornis*, n. sp.—Castaneus, pubescens, minutissime punctulatus, capite 4-foveato, fronte elongata, antennis moniliformibus; palpis minutissimis appendiculatis, thorace obcordato trifoveato, elytris latis, tibiis posticis dilatatis. Long. 2.8 m. m.

The insect before me seems to be in every respect a *Otenistes*. The general form agrees entirely with that genus; the palpi, though so very small that they cannot be seen but by a magnifier of 200 diame-

ters, are appendiculate with small setæ. The second palpal joint seems to be pedunculate, the third rounded, appendiculate, the fourth the largest, oval, not transverse, appendiculate. The head is broadest across the eyes, with two grooves before and between the eyes and two small punctures near the base of the occiput; the front is much elongated, split or sulcate in the middle and notched laterally behind the insertion of the antennæ. The antennæ are half as long as the body, the first joint emarginate at the base, obconical, and obliquely truncate at the end, the two following ones are more or less oblong, the 4th—8th are equal, rounded, nearly transverse, shorter than long, the 9th and 10th are equal, little larger than the preceding, the 11th is not thicker but more oblong. The thorax is rounded, obcordate, with the usual three impressions near the base, common to all *Ctenistes*. The elytra are broader than in other *Ctenistes* and somewhat more convex. The abdomen presents nothing unusual. The posterior tibiæ are dilated behind the middle; the second joint of the tarsi is rather inflated, thicker than usual. The ventral parts are entirely those of *Ctenistes*. The specimen before me is undoubtedly a male. It is still doubtful whether it is not a new genus, which will only be apparent by sacrificing a specimen for dissection.

This insect was kindly presented to me by Mr. Henry Ulke, who found two specimens near Washington City.

3. *Bryaxis intermedia* is another climatical variety of *B. abdominalis*, taking range between the true *B. abdominalis* and *B. floridana*. Long. 1.9 m. m.

It will be only necessary to describe the abdominal dorsal segments, as it agrees in all other respects with *B. abdominalis* and *B. floridana*.

The first segment presents those cakes of *B. abdominalis* deminutif, leaving as large an excavation between them as in *B. floridana*; the second segment is but little emarginate in the middle, so that it presents only one lobe, the spaces each side of the median line are concave, while the middle part is elevated from behind the usual punctured groove near the base down to that slight emargination on the tip; the third segment is entire, one-lobed and overhanging the rest of the segments.\*

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\* I do not regard all those as the present species and *B. floridana* as strictly true species, but as climatical aberrations of the most extreme form, that of *B. abdominalis*. Both *B. abdominalis* and *floridana* are truly maritime. There was till now none of them found in inland countries, while *Illinoensis*, which could perhaps with more right be regarded as a true species,

Two specimens have been found; one in Tennessee and the other in Washington, D. C., the latter kindly presented to me by Mr. Henry Ulke.

4. *Bryaxis perforata*, n. sp.—Nigro-picea, polita, pubescens, capite 3-foveato, antennis breviusculis, thorace lævi, 3-foveato, foveis æqualibus magnis, elytris striis dorsalibus integris, abdomine segmento dorsali primo maximo striis abbreviatis distantibus, postice medio elevato, segmento secundo in medio ad basin foveato. Long. 1.5 m. m.

*Hab.*—Nov. Eboracum (New York).

This species, belong to the neighborhood of *B. dentata*. It is much smaller, dark, shining. The head and thorax are smooth, pubescent, 3-grooved, the grooves are large and equal, the thorax is of equal dimensions, convex, subangulate, rounded. The elytra are piceous, shining, the striæ are all entire, the dorsal striæ converging. The abdomen is short, the first segment behind in the middle elevated nearly angulated, not overhanging the next segment; the abbreviated striæ are distant, well impressed. The second segment is deeply grooved in the middle of the base, somewhat depressed each side. The first ventral segment is very large. The antennæ are short, the first joint is cylindrical, equal in thickness with the second, which is oblong, rounded, the 3—5 equal, smaller, nearly globular, the 6th is a little larger, 7—8 the smallest, globular, 9—10 gradually thicker, not long-

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could never have tasted salt water. The present species comes from East Tennessee and approaches nearer to *B. abdominalis* than to *floridana*.

This series of varieties reminds me very much of the standard series of *Cicindelidæ* in the beautifully arranged collection of my friend Ulke, who takes so many varieties in his collection that nobody would find out the difference between the two next neighbors, but if you follow them up, you have at the end of the series a different species, which is nothing but a climatical variety.

Mr. Henry Ulke's collection is a truly scientific work, and the envied possessor and creator of it should give us, who are far from him, at least a show of his *Cicindela*-series by writing an Essay on climatical varieties and species, or something like it, for he is the only man in Columbia, who has the material to do it.

Other *Bryaxes*, as the *rubilunda*, shows just as many, but not so decided varieties. *Bryaxis puncticollis* and *propinqua* run into each other by varieties. The *Batrissus*-series of *scabriceps*, *globosus*, etc. up to *nigricans* and even *albionicus* and *spretus*, though they present a very different aspect, might in future be connected by apparent varieties.

*Batrissus monstrosus*, *ferox* and *cristatus* differ too little for clear species. Of others I need only mention the Northern and Southern form of *Ctenistes* (*piceous* and *Zimmermanni*) and *Pselaphus* (*Erichsoni* and *longiclavus*.) But notwithstanding, those varieties should be carefully designated and described.

er, transverse, the 11th oval, large. The antennæ, legs and palpi are testaceous.

Presented to me by Mr. Henry Ulke.

5. *Bryaxis clavata*.

To correct an error, I mention this insect again, which was reported as a variety of *conjuncta* and proved to be a true species inasmuch as it differs not only by the form of the antennæ, but more by having the anterior trochanters triangular and armed with a short, strong spine; further, the metasternum terminates in two acuminate tubercles, which is not the case in *conjuncta*.

6. *Bryaxis atlantica*, n. sp.—Elongata, contanea, nitida, capito trifoveato, occipite leviter sulcato, thorace longitudine latiore, lateribus rotundatis, fovea intermedia vix conspicua, elytris minutissime haud dense punctulatis, antennis brevibus, articulis 7mo, 8vo et 9no transversis. Long. 1.5 m. m.

This insect comes near to *B. rubicunda*, having the abbreviated striæ on the base of the first abdominal segment approximate and diverging, but differs in the thorax being rather depressed, transverse, the middle basal groove is hardly visible. The elytra are not densely and but slightly punctuated. The head is more uneven, very slightly and broadly sulcate at the base. The antennæ, which agree with those of *rubicunda* from the first to sixth joint, have the seventh smaller, globular, the eight and ninth not longer, transverse, the tenth of equal dimensions, larger, little connate, the last largest, oval. The whole length of the antennæ not exceeding the length of the head and thorax conjoined. Finally, the whole stature of the insect is more elongated than in *rubicunda*.

The specimens before me are a female from South Carolina and a male from Louisiana, which differs by the larger fifth joint of the antennæ.

7. *Bryaxis Ulkei*, n. sp.—Picea, minutissime pubescens, capite trifoveata, antennis longiusculis, thorace punctulato, foveis tribus æqualibus, elytris striis dorsalibus minus impressis, abdomine striis abbreviatis distantibus, tibiis posticis curvatis. Long. 1.6 m. m.

This interesting insect, belonging to the first section of *Bryaxis*, presents an entirely new form. The stature resembles that of *B. Illinoensis* and takes its place between the latter and *B. floridana*. The head is broader than long, trifoveate, the frontal groove smaller than the vertical ones, the antennal tubercles are elongate, the eyes prominent. The antennæ are nearly half as long as the body, the joints are cylindrical, from the first to the eighth gradually smaller, the ninth is again larger, the tenth obconical, the last largest, ovate. The thorax

is punctulate, the grooves equal in size, the exterior ones connected by dilated, slightly impressed sulcus. The abdomen has the two first segments overlapping the rest; the first segment is 4-spinous and 5-sinuate, the emargination next to the parietal margin is the largest, the median notch the deepest, consequently the two median spines are very long, acuminate; the second segment is sinuous on each side, the hind margin nearly rectilinear, with three impressions corresponding to the three intermediate sinuses of the first segment. The posterior tibiæ are curved in the same manner as in all those species belonging to this section.

This is a male, the only specimen known, and was discovered near Washington, D. C. by my friend Mr. Henry Ulke, to whose memory I dedicate this valuable addition.

Comparison of the females of *Bryaxis abdominalis*, *floridana*, *intermedia*, *Illinoiensis*, *Ulkei*, *dentata* and *perforata*.

1. *B. abdominalis*:—Body convex, capital foveæ smaller, not very deeply impressed. The thoracal foveæ smaller in comparison to the size of the thoracal disk, the basal sulcus faintly impressed near the middle.

2. *B. floridana*:—Body depressed, elongated, smaller than *abdominalis*, capital and thoracal grooves well impressed, except the frontal groove, which is ample and very slightly impressed. The thoracal sulcus the same as in *abdominalis*.

3. *B. intermedia*:—The supposed form of the ♀ comes nearer to *B. dentata*, is more convex than *floridana*, the frontal groove small, well impressed.

4. *B. Illinoiensis*:—Smaller than *B. dentata*, the capital and thoracal grooves ample, well impressed; the basal thoracal sulcus well impressed, nearly touching the intermediate groove. The thorax is more rounded than in the preceding and in *dentata*. The whole stature favors more *B. rubicunda* than any of this series.

5. *B. Ulkei*:—The supposed form of the ♀ favors most *B. dentata*. According to the ♂, the thorax is smaller in proportion, and the sides near the base are more emarginate than in *B. dentata*.

6. *B. perforata*:—The supposed form of the ♀ must come near *B. Illinoiensis*, but it is only one millimetre long, shining, black, somewhat depressed, the anterior tibiæ are not curved even in the ♂.

7. *B. dentata*:—The stature is musculous, strong in comparison to the preceding, convex, favors most a small specimen of *abdominalis*, the grooves are well impressed, the basal thoracal sulcus is not very ample, but obvious and even near the middle well impressed. The elytra are very visibly punctulate.

8. *B. clavata*:—This and *conjuncta* are hardly to be confounded with the preceding. *B. clavata* is smaller, black, legs testaceous.

9. *B. conjuncta*:—This differs in the ♀ chiefly by the size and color.

ON CERTAIN NORTH AMERICAN SPECIES OF SATYRUS.

BY W. H. EDWARDS,  
NEWBURGH, N. Y.

1. *Satyrus Pegala*, Fabricius, III, 494.  
Morris, Synopsis, &c.

Var. *Alope* ♀, Boisd. and Lec.

In the collection of Mr. John Akhurst, of Brooklyn, are two specimens, part of an invoice of twelve, that were received some years since from Northern Georgia, and which, I have no doubt, are the *Pegala*, of Fabricius, a species that has been lost sight of or considered as only a variety of *Alope*.

Both these are females and differ from *Alope* ♀ principally in having but one ocellus on the fore wings, and in size, measuring  $2\frac{8}{10}$  inches in expanse, while the largest *Alope* I have been able to obtain measured but  $2\frac{5}{10}$ . The band on fore wings is broad, light buff in color. The hind wings have one ocellus above and six below, and in these and in other respects, these specimens closely agree with the description of *Pegala*. Mr. Akhurst tells me that all the twelve showed but the one ocellus on the fore-wing. He regarded them at the time as a distinct species, and therefore, carefully preserved the two that fell to his collection. The others were sent to Europe by the collector.

(Since the foregoing paragraphs were read before the Society, I have been able to see the male of *Pegala* by the kindness of Mr. Grote. Several fine males are in his collection, taken this season by Mr. Ridings, in Georgia, which State appears to be the home of the species. These males are all of large size,  $1\frac{5}{10}$  inch in expanse, similar to the females above mentioned, having one ocellus on the fore wing, one on the hind wing above, and six beneath on the latter. These last characterize all the specimens of both sexes that I have seen, and are well developed, divided always into two groups of three, of each of which the middle ocellus is large. On one of the males is a black dot upon the fore wings, in position corresponding to the second ocellus of *Alope* and *Nephele*. The under surfaces of these specimens are beautifully reticulated, and the brown ground color is more or less washed with grey.)

2. *Satyrus Alope*, Boisd. and Lec.

3. *Erebia Nephele*, Kirby, vol. IV.

Var. *Alope*, Weidemeyer's Catalogue.



4. *Satyrus Boöpis*, Behr.

Annals of Cal. Acad. Nat. Sciences. (1864.)

Dr. Behr, in a paper upon the Satyrides of California, (Annals &c. 1864) speaks of *Ariane*, *Alope*, *Nephele* and *Pegala*, "as possibly local aberrations of one far spread species," and again, of *S. Boöpis* as "only distinguishable from *Nephele* by the absence of eyes on the under side of the hind wings," and that "it may perhaps prove a local variety or aberration of that most polymorphous and far spread species *Alope*." "In the meantime, until the connecting forms are found" he "considers it to be specifically distinct."

In nearly all cases, *Nephele* ♂ has six spots on the under side of the hind wings, but occasionally one, two or more are wanting. If, in California, a form of *Satyrus* appears usually having no eyes on the under side of the hind wings, although otherwise not distinguishable from *Nephele*, it appears to me it is properly regarded as a distinct species, and not as a local variety.

As to *Nephele* and *Alope*, the connecting forms are wanting, and, all allowance being made for ordinary variations in size, shade of color, size or number of certain spots or markings, one of these species does not run into or approach the other so as to make it uncertain to which of the two any given specimen belongs.

The most that can be said is, that in some specimens of *Nephele*, of both sexes, there is a tendency in certain characteristics to vary in the direction of *Alope*.

I have taken *Alope* and *Nephele* often and in many localities, and I have brought together every shade of variation I was able to procure, having had in mind this question of identity for some years. And I have received specimens of one or other from collections in widely separated parts of the country.

I find that *Nephele* prevails in the Northern and Eastern States among the highlands, in Northern Illinois, and in California and Oregon. *Alope* prevails in the lowlands of New York and New England, is the only species in New Jersey, Eastern Pennsylvania, on the Kanawha River, in West Virginia, in Southern Ohio and the southern states next the Ohio River. How far south it is found I do not know. It is not enumerated by Dr. Behr as found in California, nor have I met with it in collections from that region. Mr. Walsh has never seen it in Northern Illinois, while *Nephele* is there abundant.

In the Catskill Mountains *Nephele* is a very common species. Literally hundreds of specimens may be taken in a morning. *Alope* is found there very rarely, but on the Hudson River, immediately be-

low these mountains, *Alope* is common and *Nephele* not seen. Mr. Lintner mentions *Alope* as the species found in Schoharie, in the valleys next west of the Catskills, but says nothing of *Nephele*. Mr. Saunders writing from London, C. W. says "*Alope* does not occur in this neighborhood, *Nephele* does rarely." Mr. Beadle, of St. Catharine, C. W. "finds *Nephele* common, *Alope* only occasionally."

*Alope* then is a Southern species just as *Argynnis Cybele* is Southern and *Nephele* a Northern species as *A. Aphrodite* is Northern, but both meet, as do those, on common ground in the upper Middle States, though there *Nephele* occupies the highlands and *Alope* the valleys. The western limit of *Alope* we do not know, but of the two, *Nephele* alone has found its way to the mountains of California and to the Pacific coast.

The most evident difference between these two species are as follows:—

1st. *Alope* ♂ is of larger size than *Nephele* ♂, the form measuring 2 to  $2\frac{2}{10}$  inches in expanse of wing, the latter  $1\frac{8}{10}$  to 2 inches. *Alope* ♀ differs less in size, but is the larger, being  $2\frac{3}{10}$  to  $2\frac{5}{10}$ , while *Nephele* ♀ is  $2\frac{1}{10}$  to  $2\frac{4}{10}$ . (These measurements are based upon 12 ♂, 12 ♀ *Alope*, 42 ♂, 42 ♀ *Nephele*.)

2nd. *Nephele* is usually darker colored than *Alope*, the males especially being darker by several shades, in fact being almost black.

3rd. *Alope* ♂ has a yellow band on the fore wings, above and below, enclosing two black ocelli with small bluish-white pupils. *Nephele* ♂ has no such band, but the whole wing is usually dark, and there are two ocelli of much larger size below than above, with similar pupils to those of *Alope* ♂, each of which ocelli is surrounded below by a pale yellowish narrow ring, but not above, though sometimes there is a faint tinge about the ocellus above as if the ring was seen through the wing.

But occasionally, in Eastern specimens, each of the ocelli is surrounded by a pale nimbus that fades insensibly into the ground color. This nimbus is sometimes yellowish, and extends so as to unite the ocelli, both above and below, in a space shaped like a figure 8. I have not noticed this peculiarity in any Western specimens, which are wholly dark.

4th. *Alope* ♀ has a broader band on primaries, above and below, and of paler color, than the band of the male. The ocelli also are larger. *Nephele* ♀ has no such band. Sometimes the whole wing is dark as in the male, but, more often, there is a slightly paler shade than the ground color on the space that would be occupied by a band. The

ocelli on the fore-wings are similar to those of *Alope* ♀, and are usually surrounded by a yellow ring, but sometimes, in Eastern specimens, by a nimbus, as described in the male.

In the Catskills, I took two pairs of *Nephele in coitu*. In both cases the males were dark. In one of the females there is a yellowish nimbus shaped like the figure 8.

In two other cases, and the most extreme out of 135 specimens taken by me, the nimbus above has developed into a band more like that of *Alope*, but narrower, while on the under surface of each the yellow space keeps the shape of a double ring, figure 8, and is by no means a band.

Out of 42 specimens of *Nephele* ♂ now before me, each one has one small ocellus on the hind wing above; in one instance there are two, and in three instances there are three.

In 12 *Alope* ♂, 5 have an ocellus on the hind wing above, 7 have none.

Of 42 *Nephele* ♀, 23 have one such ocellus, 19 have none.

Of 12 *Alope* ♀, 5 have one such ocellus, 7 have none.

On the under side of hind wings of 42 *Nephele* ♂, 33 or more than 4 have 6 ocelli, 4 have 5, 1 has 4, 2 have 3, 1 has 1, 1 has 0.

Of 12 *Alope* ♂, 4 only have 6 ocelli on the under side of hind wings, 2 have 5, 4 have 1, 2 have 0.

Of 42 *Nephele* ♀, 6 have 6 ocelli, 2 have 4, 12 have 3, 5 have 2, 8 have 1, 9 have 0.

Of 12 *Alope* ♀, 3 have 6 ocelli, 4 have 2, 1 has 4, 4 have 0.

Therefore, in the number and constancy of the ocelli in the hind wings above and below, the females of the two species are not very different, but the males differ materially. And the most evident distinction between the species is to be found in this difference in the number of ocelli of the males, and in the size, color, and presence or absence of the yellow band in both sexes.

*Nephele* ♂ varies much more than *Alope* ♂, but by no means so much as *Nephele* ♀, which varies remarkably. In looking over a large number of the latter, it is difficult to find two alike. Sometimes the ocelli of the fore-wings are round, sometimes oval, or round with a prominence on one side. They are nearer or farther apart, larger or smaller, differing on the same wing, either ocellus being the larger. Some have a white spot in the centre, with or without a blue shadow, some have one spot, and occasionally there are two spots with a double shadow. The ocelli are surrounded by clear

or hazy rings, or by a nimbus which varies in shape, in extent and in color, and by its phases increases the general variation exceedingly. The limb of *Alope* being occupied by the yellow band, so much variation is not possible, there being simply a black ocellus and its pupil, which indeed vary in a similar manner to *Nephele*.

In every species of butterfly there is a certain range of variation. In many it is very great, as in *Colias Philodice*, *Pieris oleracea*, *Anthocaris Genutia* and *A. Sara*. The color may be lighter or darker, the bands broader or narrower, spots larger or smaller, or more numerous or altogether wanting. One species will vary in the direction of another. *Philodice* may be tinted with orange, thus approaching *Eurytheme* or *Christina*, *Terias Nicippe* may be canary yellow like *T. Lisa*, instead of orange. But in such cases there is usually no difficulty in determining to which species the varying individual belongs, for there are other characteristics that remain fixed. If an occasional *Terias* should be found varying from *Nicippe* in so many respects as to make it uncertain whether it was *Nicippe* or *Lisa*, we should call it a hybrid, though really it might be an extreme of variation. But if we constantly found such individuals and others connecting them on one side with *Nicippe* and on the other with *Lisa*, with regular intermediate grades of variation, we should pronounce the two species identical. Occasionally an *Alope* may appear with but one ocellus on the fore-wings, and, in that respect, resembling *Pegala*. The species may be expected to vary in that direction.

Certainly *Nephele* should not be taken to be an aberration of *Alope*. *Nephele* is the dominant species, having the most unrestricted range, and being vastly more numerous in individuals. The types differ as much as any other two allied species, and are indeed a long ways apart. *Alope* varies comparatively little, and very little in the direction of *Nephele*. The variation of *Nephele* is extreme and in the direction of *Alope*, but with the greater number of variations close to the type. Occasionally one individual more aberrant than the rest reaches farther towards *Alope*. That is the most that can be said. There is no regular gradation of connecting forms. If, here and there, an individual should appear that could be referred with certainty to neither, it might be either an extreme of variation, or possibly a hybrid, and would not bridge over the distance between two species like these. *Nephele*, *Ariane* and *Boöpis* form one group. *Pegala* and *Alope* another. If originally all the five were represented by one species, it is probable that *Nephele* is nearest to it and *Pegala* farthest.

We may suppose *Alope* to have sprung from *Nephele*, but its characteristics have become so fixed that its rank as a species cannot be called in question. From *Nephele* might naturally spring *Ariane* and *Boöpis*, and from *Alope*, *Pegala*. Whether the two former are entitled to rank as species future observations will determine. If they are found to preserve and perpetuate their fixed characteristics, no matter how restricted their range, they will be regarded as true species. I believe *Pegala* to have fulfilled these conditions. Naturalists cannot be influenced by a conjectural element in determining species. They must be guided by the specific characters as they find them. Any other mode leads only to confusion, especially so long as we are ignorant of the preparatory stages of the butterfly, as is the case with these species of *Satyrus*.

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**Description of certain species of DIURNAL LEPIDOPTERA found within the limits of the United States and British America. No. 5.**

BY WM. H. EDWARDS, NEWBURGH, NEW YORK.

- |  |                                   |
|--|-----------------------------------|
| 1. <i>Papilio Bairdii</i> , n. sp.                 | 5. <i>Lycæna Mertila</i> , n. sp. |
| 2. <i>Colias Behrii</i> , n. sp.                   | 6. <i>Syrichtus Alba</i> , n. sp. |
| 3. <i>Lycæna Violacea</i> , n. sp.                 | 7. <i>Hesperia Otloe</i> , n. sp. |
| 4. " <i>Pseudargiolus</i> , Boisd. and<br>LeConte. | 8. " <i>Mingo</i> , n. sp.        |
|  | 9. " <i>Yreka</i> , n. sp.        |

**PAPILIO BAIRDII, nov. sp.**

Allied to *Asterias*; primaries more produced and narrower, and secondaries more rounded than in that species.

*Male.* Expands 4 inches. Upper side black; both wings crossed by yellow bands as in *Asterias*, the spots being similarly shaped, but larger than in that species, and fading gradually into the black ground on the inner side; at the anal angle a rounder black spot within a spot that is fulvous above, yellow below; there is no trace of blue between the yellow bands on secondaries as there is in *Asterias*.

Under side black, marked as above, the yellow paler; the end of the cell on primaries a little yellow; the outer ends only of the spots beyond the cell on secondaries very slightly fulvous; each of the black spaces between the yellow bands on secondaries a little sprinkled with blue scales.

Body black; shoulders brown-yellow; two dorsal and a lateral row of yellow spots on the abdomen.

From one male from Arizona.

I have named this species in honor of Professor S. F. Baird, whose example and influence have done so much to excite and foster a love for the study of Natural History.

**COLIAS BEHRII**, nov. sp.

*Male*. Expands  $1\frac{1}{2}$  inch. Upper side greenish-yellow, much sprinkled with minute black scales, especially on primaries; base of wings black; hind margin of primaries broadly edged with black, which is covered with greenish-yellow scales and not clearly defined on the inner side; the marginal border of secondaries is clear black, of medium width, well defined on inner side, curving regularly, with no prominent projections, and terminating a little short of the anal angle, costa of primaries rose-colored; discal spot a minute yellow streak edged with black scales; discal spot of secondaries small, round and yellow; fringes greenish-yellow.

Under side greenish-yellow, paler than secondaries above, entirely speckled with black scales, except on inner margin of primaries, where the color is whitish; discal spot of primaries a yellow streak, of secondaries minute, yellow, edged with a few rosy scales; costa of each wing rose-colored; abdomen and palpi greenish-yellow; legs and antennæ rose-colored.

*Female*. A little larger than the male, paler green, the marginal black border less distinct and more expanded at apex of primaries; fringes both above and below roseate, in contrast to the fringes of the male, which are yellow.

From 2 ♂, 1 ♀, received from Dr. Behr, and taken among the Yo Semite mountains at an elevation of about 10,000 feet above the sea.

**LYCÆNA VIOLACEA**, nov. sp.

*Males*. Expand from  $\frac{9}{10}$  to  $1\frac{2}{10}$  inch. Upper side usually deep glossy violet-blue, but sometimes with a pink tinge; costal margin of primaries silvery; hind margins of both wings edged by a black line which is expanded on the apical half of primaries into a border; on this part of the wing the fringe is black, but on the lower half, and on secondaries, it is white, with black at the ends of the nervules; occasionally on secondaries it is entirely white; in many cases the black marginal line turns the anal angle and there thickens, so as to make a noticeable spot; as often there is a black elongated spot at the outer angle, and sometimes five or six dots between these along the margin.

Under side of both wings greyish-white, of uniform color entirely to the margin; primaries have a dark grey discal streak, a submarginal transverse row of six rather broad, mostly elongated black spots, the first next costa in advance of the line, the others parallel to the margin, the 3rd, 4th, 5th standing obliquely; along the margin a row of

six points, often partly obsolete, each preceded by a distinct dark-grey crescent, these last uniting so as to make a crenated line.

Secondaries have a discal streak; three black spots in a row half way between the streak and base, one being on either margin, the third midway between them; a transverse row of eight clear black spots across the disc, the two next costa largest, much in advance of the others, and over against the streak, with which and the 8th spot they form a direct line; the 3rd is separated from the 2nd by a considerable space, the 4th is turned obliquely; the 7th is long and lunular and back of the line; the 8th very near the margin, elongate; along the margin is a row of six blackish dots, palest at outer angle, that next anal angle double, the one preceding largest and conspicuous; each spot surmounted by a crescent as on primaries.

Body above blue, beneath white; palpi white; antennæ black ringed with white; club black, tipped with ferruginous.

From upwards of 100 males taken on the Kanawha River, March and April, 1865 and April, 1866.

*Female.* Paler and dull-colored, the hind margin and apex of primaries with a broad blackish border; costa of both wings a little obscured by same color.

From two ♀ taken near Philadelphia. These resemble the ♀ of *Lucia* on the upper side, but are unicolorous below.

I have myself taken but one female of this species, and this is abnormal, resembling the male almost exactly in color as well as markings, the only difference being that the disc of secondaries is paler than the margin. The under side is almost white, and the spots are large and clear colored. The second and third terminal segments of the abdomen are black above. Unfortunately, in both seasons, I left the Kanawha before the females would naturally be flying, which would be two weeks or more after the first appearance of the males. Probably they are equally abundant with the males, as is the case with the females of *pseudargiolus*, but like the latter they may be found in different localities from the males.

*Violacea* appears in the first warm days of spring. I took it in 1865 on the 17th March. It is gregarious, frequenting in great numbers the edges of the creeks and wet places in the road. I have thrown the net over a dozen or more at once, and have attracted them by the decoy of a dead specimen pinned to the ground. Occasionally one or two may be seen about the flowers of the peach tree, which blooms at the same season, but they are not partial to flowers.

I have noticed this species for several years, and was struck from the first by its deep shade of color as well as its habits and its early appearance, but was inclined to consider it a variety of *Lucia*, Kirby, a species wide spread, though apparently nowhere common, in the northern parts of the continent. But after comparing large numbers of them with undoubted *Lucias* from many localities, I am satisfied it is a distinct species. As the description of *Lucia* is not copied in full in Morris's synopsis, I give it here for the purpose of comparison.

"Primaries (below) cinerascens, with four (4) indistinct eyelets in the margin; secondaries *brownish ash color, spotted with black and white*, with five (5) eyelets in the margin.

"Wings above silvery-blue, terminating, especially at the posterior margin, in a slender black line; fringe white barred with black; primaries underneath *ash-colored, mottled with white*; on the disc is a black crescent and a curved macular band, consisting mostly of oblique black crescents edged with white, especially on their under side; the wing terminates posteriorly in a broadish brown band, formed chiefly by obsolete eyelets; the secondaries are *brown, spotted and striped with black and white*; towards the posterior margin the white spots are arranged in a transverse band parallel with it, and as in the primaries; the wing terminates in several obsolete eyelets."

The present species is of a very different blue from *Lucia*, which is whitish, and perhaps might be called "silvery," (though that term would seem to imply a metallic shade, which *Lucia* has not,) and the apical portion of the hind margin of primaries bears a conspicuous black border. The entire surface of the under side of *violacea* is greyish-white, of the other the primaries are "ash-colored mottled with white," the secondaries "brown, spotted and striped with black and white," each wing terminating in a "brown band" co-extensive with the eyelets. The figure given by Kirby represents a large, triangular patch of brown upon secondaries in addition to the brown margins. There is nothing of these features or of mottling in the Kanawha specimens.

From Maine, I have three ♂ of *Lucia*, one of which displays the patch exactly as in the figure of Kirby, the other two want this, but all have the brown borders. One ♂ from London, C. W. has both patch and borders. A pair taken by Mr. Ridings, at Pike's Peak, show the same. Of four ♂ and one ♀, taken at Fort Simpson, all have the brown borders and mottled surface, the ♀ only the triangular patch. Three ♀



taken at Newburgh have the borders, but not the patch, and both are mottled with white.

(The period of *Lucia* is probably considerably later relatively than *violacea*. Those from Newburgh were taken about the 25th May, some weeks after the blooming of the peach trees, with which, in Kanawha, *violacea* is cotemporary. The latter is the earliest butterfly of the spring. The former is preceded by several species.)

I think, therefore, it will not be doubted that *violacea* is a distinct species. How widely it may be distributed I have not yet the means of knowing. Probably it will be found in Ohio and the lower Middle States.

LYCÆNA PSEUDARGIOLUS, Bois'l. and LeConte.

*Argiolus*, Abbot and Smith.

*Male*. Expands  $1\frac{4}{10}$  inch. Upper side delicate pale blue, with a pink tinge; costa of primaries silvery; hind margins edged by a black line, which rarely is expanded on the apical half of primaries into a border; fringes black and white on primaries, white on secondaries.

Under side white, sometimes pure but oftener with a greyish tinge; the spots and markings are pale black or brown, and often nearly or quite wanting; when distinct, primaries have a discal streak, a transverse row of six spots, mostly elongated, the 3rd, 4th and 5th turned obliquely, the 6th frequently wanting; a marginal row of dots, each preceded by a serrated tooth.

Secondaries have three dots in a transverse row near the base; a discal streak; a row of eight minute spots across the disc, the two next costa much in advance of the others, the next four and the 8th nearly parallel to the margin, the 7th back of the line; the margin bordered by a row of black points, each preceded by a serrated tooth as on primaries.

Body above blue, below white; palpi black above, white below, tipped with white; antennæ black, ringed with white; club black tipped with ferruginous.

*Female*. Same size. The apical half of costal margin and the whole of hind margin of primaries and costal of secondaries broadly, and basal half of primaries narrowly, edged with blackish; the rest of primaries metallic violet-blue, (sometimes lilac or green), except a large whitish patch on the disc; secondaries a duller blue, not metallic, the hind margin edged with a row of small, rounded, blackish spots.

Under side purer white than the average of males.

Found occasionally in great numbers on the Kanawha River, West Virginia, in the months of May and June, (after *violacea* has disap-

peared,) the males usually along the road or edges of woods; the females in the woods about the flowers of the "rattle weed."

I have re-described *pseudargiolus*, as the description in Boisduval and LeConte is imperfect, and may apply equally well to this species, or to *neglecta* or to *violacea*, and the figure of the male is not *pseudargiolus*, but nearer *violacea*, being same size, very like it beneath, but not well colored on the upper side. *Neglecta* I described in the Proc. Acad. Nat. Sci., Phil., 1862. It is a Northern species, closely allied to *pseudargiolus* and replacing it, of smaller size, with primaries azure blue, pale in the disc, and secondaries grey-blue, with azure margin, resembling the other in the color of under side and in markings, except that they are less delicate. *Pseudargiolus* was first described by Abbot and Smith, and regarded as identical with *argiolus* of Europe and so named. It does closely resemble that species in size and color above. The name and mention of identity with *argiolus* would be enough to determine the true *pseudargiolus* to be the one I have described above, although Abbot's figure is not drawn or colored with sufficient delicacy to make it reliable where nice differences exist. Certainly neither *neglecta* nor *violacea* could be spoken of as identical in "size and color" with *argiolus*. My attention has been called to some remarks of Mr. Edward Doubleday, in the "Entomologist," No. 14, December, 1841, page 209, appended to his description of *Polyommatus (Lycæna) Lygdamas*, which description, by the way, is not copied into Morris' Synopsis. Mr. Doubleday says, "now that I am on the subject of the North American Polyommatus, I may just express my opinion that two species are confounded under the name *pseudargiolus*, one a Northern species, with the markings of the under surface very distinct and coarse, the other a southern one, in which all the markings below are beautifully delicate; but having taken few specimens in the North, and these all females, I dare not speak positively on this head."

*Neglecta* is found here and there over the Northern States and Canada, and is regarded by collectors, as a not very common species. So far as my own experience went, before the present year (1866) but two or three specimens were likely to be seen upon a June day. The best locality, I knew of, for taking them, was near the "Fawn's Leap," in the Catskill "Clove," where a few may always be found, on a sunny morning, flying about the wet spots by the road-side. But, last June, in Kanawha, near Coalburgh, this species appeared in as great numbers as did *violacea* two months previous, and as did *pseudargiolus*, in June,

1865. What surprised me was, that not one of the latter, either ♂ or ♀, was seen by me that season. Nor did I see a ♀ of *Neglecta*, although the males were to be seen everywhere along the roads, where there was a moist spot for them to gather on. The ♀ of *pseudargiohus* I took in 1865, on the flowers of the rattle weed, as stated above, and they were more numerous, if anything, than the males. But, although in 1866 I watched these flowers carefully, not a *neglecta* of either sex was seen about them. Where the ♀ was to be found I did not discover.

Every out-door collector knows that this disappearance or replacing of one species by another, is not unusual.

*LYCÆNA MERTILA*, nov. sp.

*Female*. Expands  $1\frac{1}{10}$  inch. Primaries long and narrow; both wings brown, with slate-colored hairs at base and along inner margin of primaries.

Under side clear cineraceous; bluish at base; primaries have a single transverse sinuous row of round black spots, each circled with white, as also in the lunule in the arc; from the arc a whitish ray runs toward the base.

Secondaries have a row of eight small black spots in points, each circled with white; of these, two are on central margin, four nearly parallel with the hind margin; the seventh below the others and geminate; the eighth minute, nearly concealed in the marginal hairs; between the 2nd and 3rd and the 6th and 7th the spaces are wide; on the arc a streak, and midway between this and the base a black point; on the costa above this one slightly larger, all circled with white.

From California.

The male of this distinct species I have not seen.

*SYRICHTUS ALBA*, nov. sp.

*Male*. Expands  $1\frac{5}{10}$  inch. Upper side of both wings white, the bases and basal half of the abdominal margin of secondaries bluish-grey; hind margins edged with a dark line, on which rests a series of blackish serrated spots, the two next the apex of primaries small and double, the 3rd and 4th smaller than the 2nd, with a few dark scales preceding; the 5th double; the ends of all the nervules black; the four apical nervules black at their insertion, making a conspicuous triangular spot, the inner of the four nervules projecting a spur half way to the hind margin, under the end of which spur are a few black scales indicating an obsolete rounded spot; fringe white, but on primaries with a dark line running through it.

Under side white; an indistinct soiled patch at apex of primaries;

a pale-brown spot on the costa, with projecting spur, corresponding with the spot of upper surface.

Secondaries have the anterior two-thirds clouded with a faint yellowish-brown shade, which is deepest on the costa and in the middle of the disc; the same shade colors the margin.

Body blue-grey, beneath white; legs and palpi white; antennæ white below and black above, annulated with white; club ferruginous.

From 2 ♂ taken in Arizona.

**HESPERIA OTTOE**, nov. sp.

*Male.* Expands  $1\frac{3}{10}$  inch. Primaries long and narrow, and the form of both wings similar to *H. uncas* and *H. napa*.

Upper side uniform ochrey-yellow; hind margins and costa of secondaries slightly edged with blackish; abdominal margin and the submedian interspace sprinkled with black; stigma straight and rather broad; fringes ochrey-yellow.

Under side paler; without spots, except a blackish patch at base of primaries below the sub-costal.

Body above ochrey-yellow; below pale; palpi yellow-white.

In the specimen described, the antennæ are wanting.

From one ♂ taken in Kansas.

**HESPERIA MINGO**, nov. sp.

*Male.* Expands 1 inch. Upper side brown, much marked with bright fulvous, which covers the central margin of primaries from the base to near the end of the cell and back to the median nervure, excepting a brown streak in the cell from the base; a submarginal, oblique row of confluent spots extends from the costa to the inner margin, broken opposite the cell, two small spots ranging outside the line, with a space between them and the costal spot; edge of inner margin also fulvous.

Secondaries have a similar row, or rather, one long spot across the wing, and two spots in the disc and on costa; fringes fulvous.

Under side pale-brown washed with fulvous, which last color prevails on the apical part of primaries and the anterior half of secondaries; the spots of upper surface re-appear enlarged, and the two spots near apex of primaries are connected with the costal spots.

Antennæ black; club black above, fulvous below.

Taken in Kanawha County, W. Va.

**HESPERIA YREKA**, nov. sp.

*Male.* Expands 1 inch. Upper side russet-brown; primaries have the costa next base and the cell fulvous; three minute, semi-transpa-

rent spots depend from the costa beyond the cell; an oblique row of similar spots back of the stigma; this last is narrow, nearly straight, edged on either side with black scales.

Secondaries have the disc fulvous obscured with brown, clearest towards the margin; a clear fulvous spot in the cell; fringes grey, but pale-reddish at the anal angle.

Under side ochrey-yellow; on primaries a black mark, forked at the extremity, represents the stigma; sometimes there is a black shade at the inner angle of primaries, but often it is wanting; all the semi-transparent spots reappear. Secondaries without spot or mark, a slightly paler shade indicates the fulvous space of upper side. Body above brown; the extremity of the abdomen ferruginous.

San Francisco.

The following species were received from Arizona:—

*Papilio Bairdii*, *Pieris Protodice*, *Colias Eurytheme*, *Terias Nicippe*, *Nathalis Iole*, *Danaïs Berenice*, *Argynnis Columbina*, *Vanessa Cardui*, *Vanessa Carye*, *Libythea Carinenta*, *Lycæna exilis*, *Nemeobius venusta*, *Hesperia alba*.



#### Description of a new species of **CHRY SOPHANUS**.

BY H. BEHR, M. D.

##### **CHRY SOPHANUS RUBIDUS**, nov. sp.

*Male*. Expands  $1\frac{2}{10}$  inch. Upper side uniform bright copper-red, secondaries having a narrow border along the hind margin of lighter color; both wings edged by a black line; fringes grey, several of the spots of under side of primaries show faintly through the wing; on secondaries a faint discal streak.

Under side white, with a faint tinge of orange; no spots on secondaries; primaries have a marginal row of not very distinct brownish spots, wanting on the upper half of the wing; a sinuous row of six clear, black, rounded spots across the disc, the 6th spot double; a long spot on the arc; two round spots in the cell and one below.

Antennæ black above, ringed with white, whitish below; tips ferruginous.

One ♂ received from the interior of Oregon.

ON CERTAIN ENTOMOLOGICAL SPECULATIONS.—A REVIEW.

BY A. S. PACKARD, JR., M. D.

In the Proceedings of this Society for August, 1864, Mr. B. D. Walsh, in the course of his remarks "On certain Entomological Speculations of the New England School of Naturalists," discusses some points of common interest to all zoölogists.

The discoveries of embryologists proving that the winged insect, in the course of its growth, successively passes through stages (the larva and pupa) which are analogous in form, to the adult state of the Worm and Crustacean, respectively, are ridiculed by our author as a matter of pure fancy. Oken in 1821 said, "Every fly creeps as a worm out of the egg; then, by changing into the pupa, it becomes a crab, and lastly, a perfect fly."\*

These words it remained for Von Baer† to prove, when in 1828 he laid down the general law of embryology, that all animals in starting from the egg state, must, in order to reach maturity, pass through forms which resemble the adult state of those beneath them in the scale of life. The subject is abundantly enforced in many recent works, especially those of Rathke, Newport, Müller, Agassiz, Milne Edwards, Dana, and others, and is so familiar to the well-informed naturalist, that it need not detain us farther.

In the first place, Mr. Walsh disputes the statement that the *larva* of an insect is like a worm, considering the phrase "worm-like" as "loose and indefinite." But what is a worm? Our author provides us with no definition. We are simply led to infer from a paragraph on page 233, that every *worm* must be necessarily more than twice as long as broad, as he states that the larva of *Limacodes*, which is elliptical in shape, is "anything but worm-like." Hence our author consigns to oblivion all those members of the class *Vermes* which do not come up to his mathematical standard of what a worm ought to be. He rejects from his rolls every unfortunate *Annelid* which is not more than twice as long as broad.

It would appear as if Mr. Walsh had before him a figure of the earth-worm, a very long, cylindrical and slender-bodied form. This we admit to be the typical form of the class. But this form will not answer as a gauge for the entire class.

Where would he place in his New System of *Annelids*, such obsti-

\* *Naturgeschichte für Schulen*, p. 577 as quoted by R. Owen. *Lectures on the Comparative Anatomy and Physiology of the Invertebrate Animals*. London, 1843, p. 247.

† *Ueber Entwickelungsgeschichte*, etc. Theil, I, p. 230. 1828.

nate forms as Euphrosyne, Cryptonota, Polynoe, and some twenty additional genera closely allied, and which are among the most typical of their class, though all are elliptical, flat, and scarcely twice as long as broad? Would he exclude from his "System," the *flat-worms*, Leptoplana, Typholepta, Polyscelis, Mesostomum, Planocera, Thysanozoön, and a host of other flattened, cylindrical, "unworm-like" forms, most strangely unlike our author's typical attenuated theoretical "worm?"

Surely, to bridge over the immense gaps between an adult Gordius and an elliptical, flattened, worm-like Leptoplana, demands "that highest faith" of which Mr. Walsh quite apparently "falls short."

In the writings of Leuckart, Siebold, Quatrefages, Milne Edwards, Desor, Girard, Sars and Grube, who have ably expounded the laws of the development and classification of Annelids, may our author, if he be "content trustfully to follow the evidence, whithersoever it leads," learn that even the Hair-worm (Gordius) "harmonizes" in structure with the Leptoplana and other flattened elliptical "*unworm-like*" annelids.

Mr. Walsh, for the same reason, on page 233, contends that the larva of the Katydid (*Platyphyllum concavum* Harr.) cannot be worm-like, because it is "only about one-half longer than wide," and is not "curled up in its egg." This statement may be offset by the observation of Mr. Andrew Murray,\* that the young *Blatta* is "vermiform."

In alluding to the erroneous statement that the larval and pupal states of some Orthoptera are passed within the egg before hatching, Mr. Walsh is probably unaware that the statement of Mr. Murray, that the *Phyllium* passes the larval and pupal stages in the egg, has by Mr. Murray himself, in the article above referred to (*Linnæan Proceedings*), been very candidly stated to have been the result of imperfect observations; and as it proved, are quite erroneous. Mr. Murray distinctly avows, however, his belief that the so-called larva and pupa of many Orthoptera and Hemiptera, are but adult forms, as was also maintained by Prof. R. Owen in his lecture on the Invertebrate Animals, in 1843.

We are glad to agree with Mr. Walsh, in maintaining that what generally are considered as larval and pupal forms of Hemiptera and Orthoptera, are really such, though it is well-known that immature Hemiptera have been found sexually united, as has been observed in regard to some Orthoptera. The statement of Prof. Owen, that the "apodal," "acephalous" embryo of *Blatta*, corresponds to the larva

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\* *Proceedings Linnæan Society*, vol. vii, 1862.

and pupa of insects generally, we do not feel prepared to accept. The works of Herold,\* Siebold,† Claparède,‡ and Weismann,§ show in a most convincing manner, that the apodal, acephalous form, is common in the embryonic or ante-larval life of those insects whose metamorphosis is most complete.

The terms *larva* and *pupa* are useful as conventional terms among naturalists, but they are by no means fixed, immutable shapes in the majority of insects. Though these stages are less transient in the Lepidoptera and Diptera and Coleoptera, from special ends in their economy; Mr. Lubbock has shown that the Ephemera (Chloeon) moults twenty times, which involves a succession of twenty-one distinct forms before the insect reaches maturity.

In the development of the Humble Bee (*Bombus*), we have shown that it is difficult to draw a definite line, in life, between the embryo just before leaving the egg, and the recently hatched larva; between the larva and semi-pupa, and between the so-called pupa and adult bee, so gradual are the changes which lead from one stage to the other.

By no means, then, can we subscribe to the astounding statement made in another place,|| that "Authors are perpetually forgetting that Annulate animals pass from one state to another only by suddenly moulting their skeletons, while vertebrate animals retain the same skeleton throughout, and pass from one state to another by the slow and gradual accretion of new matter," p. 563.

Are we to be again troubled by comparisons between the *crust* (arthroderm) of articulates, and the *skeletons* of vertebrate animals? Why dig up from their graves these long-buried notions of G. St. Hilaire and other writers of that school, who suggested such views, brilliant as at first sight they seemed, though now confessedly obsolete?

Again, hear our objector—"I am also very skeptical as to certain assertions of Harris and Fitch, that the larva of *Cecidomyia* transforms *gradually* into the pupa state, by a kind of budding process, without moulting the larval integument, instead of *suddenly* moulting into the pupa state, as in all other insects. This theory seems to have been devised in order to harmonize with the erroneous hypothesis already referred to, viz: that the cocoon of the Hessian Fly is made out of the external integument of the larva, and so prevent the

\* Exercitationes de animalium vertebris carentium in ovo formatione. 1824.

† Observations de primo insectorum genesis. 1842.

‡ De l'évolution des Araignées. 1865.

§ Die Entwicklung der Dipteren. 1864.

|| On the Insects, Coleopterous, Hymenopterous and Dipterous, inhabiting the galls of certain species of willow. Part 1st.—Diptera. By B. D. Walsh, M. A. Proc. Ent. Soc. Phil., Dec. 1864, p. 543.



necessity of assuming that the larva moulted twice over to pass into the pupa state. [See Harris' *Insects*, etc., p. 577.] Thus, perhaps, as often happens, one mistake has given truth to another, and in stopping one leak, another has been opened."\*

Here Mr. Walsh terms as "*certain assertions*," what are matters of *pure observation* with these two authors. He shows that he has never carefully observed an insect through its transformations. He evinces an utter ignorance of the mode of growth of animals, i. e. by the formation of new cells. He contends that insects *suddenly* moult into the pupa state, as if by a kaleidoscopic process, or by the sudden shifting of theatrical scenery. He denies a well-known fact, that the Hessian Fly and two other species of *Cecidomyia* have coarctate pupæ. He forces upon the authors just mentioned, the awkward necessity of assuming "that the larva moulted twice over, to pass into the pupa state," which is by no means the case. And finally, "as often happens" in the theoretical writings of our author, "one mistake has given birth to another, and in stopping one leak another has been opened!"

Listen first to the statement of Dr. Harris.

"From the foregoing passages,† it appears that the transition of the insect, within the flaxseed case, from the form of a larva or maggot, to that of a mature pupa, takes place only a short time before its final transformation to a fly, that is, towards the end of April or beginning of May; and that the scarf or proper skin of this pupa is the same as that wherein the body of the insect had been previously enveloped. In this respect, the Hessian fly agrees in its transformations with the willow gall-fly; and doubtless the transition in question is affected in the same way as in that insect. But the larva of the Hessian fly does not spin a silken web or cocoon like that of the willow gall-fly and some other *Cecidomyians*; and it differs from these insects, also, in being finally invested with two skins, the outer one, when detached, serving instead of a cocoon for the included insect, while the inner

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\* Loc. cit. p. 562.

† In which he quotes the direct observation of that most accurate and painstaking observer, Mr. E. C. Herrick, as follows:—"The process of growth goes on, and, by and by, on opening the leathery maggot skin, now a puparium, you find the pupa so far advanced that some of the members of the future Fly are discernable through the scarf which envelopes and fetters it on all sides." In a letter to Harris.

Again in his article in the Patent office report, 1844, p. 163, as quoted by Harris on p. 577. Mr. Herrick states: "Within this shell (the flax seed case) the pupa *gradually* advances towards the winged state: it contracts in length, but not in breadth; and its skin appears covered with minute elevations. Just before evolution (of the fly), we find the pupa invested in a delicate membrane or scarf, which not long previous was its outer skin, through which many parts of the future fly may be distinctly seen." The italic are ours.

one, of a much thinner and more delicate texture, becomes the true skin of the matured pupa," p. 577.

Second. Hear Dr. A. Fitch\* in regard to the semi-pupa state of *Cecidomyia*, who has been the first, as far as we are aware, up to the date of this article, to observe and plainly designate this state in the *Diptera*, terming it the *embryo-pupa*.

"Thus, from these observations we obtain a pretty full and distinct view of the processes whereby the insects of this genus *Cecidomyia* become changed from larvæ to pupæ, by this transformation losing the mouth and jaws of the worm and acquiring the rudimentary wings and legs of the fly. As the first step of this change, at the anterior end of the larva the *cutis* or opaque inner skin becomes wholly broken up and dissolved into a watery fluid, whereby the thin transparent outer skin or *cuticle* is elevated like a vesicle or blister, which occupies about a fourth of the length of the worm on its under side, but is much shorter on its back. The insect is now in its embryo-pupa state, having lost its larva form and having not yet assumed its pupa form. In the fluid contained in this vesicle the wings, legs and antennæ of the future fly now begin to be developed whereby the sheaths of the wings at length come to be discerned immediately under the skin. This skin is exceedingly thin, delicate and transparent, like the *tunica arachnoides* of the human brain, a mere film as thin as a spider's web. Eventually, the insect by gently writhing ruptures this film at its anterior end and gradually crowds it off downward to the lower end of the vesicle, carrying the minute black jaws of the larva with it. It there remains, becoming dry and torn into shreds which flake and fall off by the continued motions of the insect. At the same time, from the remainder of the surface not occupied by this vesicle, a still more slight and delicate film, appearing as though the worm had been wet in milk which dried upon it, forming an exceedingly thin pellicle or scurf, becomes separated by the same motions of the insect and drops off in minute scales scarcely to be perceived with a magnifying glass. And now the insect has acquired its perfect pupa form, the moulting which occurs in this change being, not a throwing off of an entire skin like that which the larva often parts with when it is done feeding, and that which the pupa always leaves when it changes to a fly, but only a slight scurf-like exfoliation from the surface—so slight that in a small delicate species like the wheat midge it is doubtful whether any indications of it can be perceived, p. 807."

Newport also briefly describes a similar process in the same period of life, in the *Hymenoptera* and *Lepidoptera*, as regards the changes of the body-walls of the insect, with a detailed and richly illustrated account of the nervous system, in the *Philosophical Transactions*, London, 1832—36.

This *semi-pupa* stage is, then, precisely similar to that which we have observed in *Bombus*,\* in alcoholic specimens, but which Dr. Fitch, by an ingenious device whereby he caused the *Cecidomyia* to

\* Sixth Report on the Noxious and other insects of the State of New York, by A. S. Fitch, M. D. *Transactions of the New York State Agricultural Society*, 1860. Albany, 1861, p. 806 and 809.

assume this state in the day-time instead of at night, has actually observed in life. We have shown that the semi-pupa skin of *Bombus* comes off in shreds, like that of *Cecidomyia*, and especially how slow and gradual is the process. We should also add, that we have observed the inception of this state, when the semi-pupa skin is forming beneath the larva skin, in several Ichneumons, in two species of Tenthredinidæ, in a species of a Micro-lepidopterous larva which had been paralyzed by the sting of an *Odynerus*, though still alive, and in which these remarkable changes of form could be observed at leisure; and that we have hastily noted, with a view to future more extended study, these changes in the living larvæ of *Polistes* and *Vespa*, and in alcoholic specimens of *Clisiocampa* collected for that express purpose.

From these unpublished observations which confirm those already published and above referred to, we feel quite confident in asserting that the larvæ of insects as a general rule, transform *gradually* by the normal process of growth, *i. e.* increase by cell-growth or a budding process, and the consequent formation of new tissues, "instead of *suddenly* moulting" into the pupa state.

We would prefer, then, to call *semi-pupa* what Westwood, Harris and other authors call "larva," *i. e.* the insect, half larva and half pupa, which lies within the puparium. That the larva exists in its *normal* condition inside the "flax-seed" envelope, is nowhere stated by Dr. Harris, for the context would not imply it; and this state is by Dr. Fitch, distinctly termed the "embryo-pupa." "The very mature larva and the true pupa states," then, scarcely appear so "radically distinct" as insisted on by our author; and this "utterly anomalous" "Harrisian theory" "that the change from the larva to the pupa state is *gradually and slowly* effected," will hold its own against the "utterly anomalous theory" set up to oppose it.

In the same article just cited, Mr. Walsh proposes the "utterly anomalous theory" "that the cocoon of the gall-gnats is exuded, and not spun," adding that "It must, therefore, be either blown like a bubble, or be daubed on the walls of the cell by the body of the insect,"—p. 566.

Now, everybody knows that the silk spun by insects is exuded through the mouth from the silk glands, and that in reaching the air, the secretion, from being gummy, changes to the nature of silk. But very satisfactorily to himself, our author sets aside any such facts, and without first attempting to demonstrate by dissection the existence

\* Proceedings Boston Society Natural History, X, p. 279. We should here state that we were unaware of the observations of Dr. Fitch, not having read, until a few days since, either Fitch's remarks or Mr. Walsh's criticism on it.

of any special glands for the secretion, other than those emptying into the mouth; or to seek for special outlets on the "general surface of the body" of the larva, proposes what might be well termed "The Walshian theory of the Smearing and Daubing process observed in the Construction of the Cocoons of ALL *Cecidomyia*!"\*

One scarcely knows at what point to attack this theory, so "utterly anomalous" are the author's premises, and so strange his conclusions. When it comes to this, that such gentle, quiet natures, as those of the immature Gall-fly, assume *suddenly* the fierce brusqueness of the Bombardier beetle, (*Brachinus*), and by a sudden discharge of its pent-up gases—from what secret reservoirs, our author deigns not to point out to us—blows out like a bubble, the mass of viscosity about it, we actually doubt whether our author in discussing this point, has shown his usual acumen, or better, we will "get over the difficulty by supposing some abnormal affection of the larva," p. 566.†

Our observations on the cocoon of an undescribed species of *Cecidomyia*, which closely resembles in its habits *C. pini inopis* of Osten-Sacken, and which transforms on the terminal shoots of the common yellow pine (*Pinus rigida*) lead us to agree with Harris, that the thin, exceedingly delicate cocoon is spun, being neither exuded other than through the mouth, nor a true puparium formed by the old larva skin. We have before us several cocoons which have been soaking several days in alcohol. The pitch has dissolved off, leaving a thin, delicate cocoon, like tissue paper, and in all respects closely resembling the thin cocoons of *Pelopæus* and many other hymenopters of the families *Apidæ*, *Andrenidæ*, *Vespidæ*, and *Ichneumonidæ*.

We therefore fail to deduce the conclusion that the embryo of the Katydid is not worm-like, because it is not, owing to the form of the long, slender egg itself, curved within the egg.

The fact that most lepidopterous larvæ are "worm-like," seems to follow from the reasoning of our author, who states that they are curved upon themselves in their spherical eggs. Twice, on pp. 233

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\*"I believe that it is in this manner that the pupal cocoon of *all* *Cecidomyia* is formed, i. e. that it is not spun by the larva, but secreted in a glutinous form from the general surface of its body." L. c. p. 560.

†"From the careful study of the phenomena presented by the cocoons of the Willow Gall-gnats, I have arrived at the conclusion, that after secreting the glutinous matter from the general surface of their bodies, they must then discharge something of a gaseous nature probably from the same pores which secreted the glutinous matter, so as to detach the adhesive material from their external integument, and blow it up into a kind of bubble. We know that the imago of the Coleopterous *Brachinus* has the power of discharging a very acrid gas from its anus, and that most plant-feeding Heteroptera in all their states discharge a fetid gas from a large opening like a spiracle on the inferior surface of their bodies." L. c. p. 565.

and 234, does Mr. Walsh in self-contradiction of his main proposition, tacitly admit that most lepidopterous larvæ, and some coleopterous larvæ, are worm-like, even according to his mathematical definition of a worm. The apparent exceptions to a typical worm-like form are, then, no violations of a general law.

The idea that the pupa of an insect bears a resemblance to a Crustacean, is combatted with much vigor. Mr. Walsh states that in the pupæ of most insects, namely, in the "Lepidoptera, Hymenoptera, Coleoptera, Diptera and the true Neuroptera . . . the head is connected with the thorax by a very distinct connate suture, and in many Coleoptera, especially Tetramera, and most Hymenoptera and Neuroptera, there is, in addition, a very distinct constriction or neck at this suture, thus offering not the faintest resemblance to the Crustacean Cephalothorax," p. 235.

In the sentence preceding that from which this quotation is taken, we are informed that a Crustacean differs from an Insect in having a "head soldered to the thorax without any sutures." We cannot rightly conceive of a "head" in distinction from the rest of the body among the Crustaceans. The researches of Rathke on the Development of *Astacus*, and the statement of Prof. Dana\* that the development of the cephalothorax proceeds from a single centre, show plainly that there are in this class but two centres of development, i. e. the cephalothorax and abdomen.

In the pupa of the Mosquito, *Corethra*, and allied genera, where the head is closely united with the large thorax, we have the strongest resemblance to some of the Stomapods and young Decapods, and especially the Amphipodous *Hyperia*, and if such comparisons as these seem too vague and remote, we would inquire what are Analogies and Resemblances in nature, if these striking recurrences of homomorphous forms are not? We would remind our author of his own quotations to this effect from Latreille, (p. 244), that "Nature seems to work after a certain limited number of patterns, which she reproduces with modifications in widely distinct classes and orders," which is quoted with much satisfaction, when our writer discourses on the origin of his "Phytophagic species." Latreille's statement that an insect may resemble class-forms, quite remote in their natural series, is discarded when our author scouts one of the prime laws of animal growth; but is adopted most illogically when he so glibly talks of the origin of his so-called "species."

The general analogy of the pupa of Insects to the Order of Arach-

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\* Crustacea of the U. S. Exploring Expedition.

nida, and of the larva to the Myriapods, also denied by Mr. Walsh, is grounded on the same principles as the Class resemblances, and need not detain us here.

In fact there is a common, typical, worm-like form, of which all articulates, whether they be Insects or Crustacea, Myriapods or Arachnida, are but simply a modification. All degraded Articulates, all embryos of the Insecta and Crustacea tend at first to assume a general cylindrical, elongate form, be its length twice, or thrice, or quadruple the width of the body.

Of the female degraded Bopyridæ, Mr. Spence Bate, the eminent English Carcinologist, states that they "diverge to so large a degree that in *Entoniscus* and *Cryptoniscus* they would, but for the character of their larvæ, be mistaken for *Planariæ* or *Annelids*."\*

Fritz Müller in his Work entitled "*Für Darwin*," as stated by Mr. Bate, speaks of the "worm-like larval skin" of some Isopoda. The degraded female *Sacculina* and *Peltogaster*, so closely related to the *Cirrepedia*, are strikingly like some *Planarians* and *Nemerteans*.

Both the biregional form of the Crustacean with its cephalothorax and abdomen, and the triregional cephalized Insect with its head differentiated from the posterior part of the body, are but a more special working out of the archetypal worm-like form.

With these principles of the classification of Articulates in view, we might have been spared such short-sighted and shallow criticism as appears in the pages under review.

Again, Mr. Walsh calls in question a statement made by us† that the dipterous genus *Laphria*, by reason of its plump, hirsute body resembles a *Bombus*, objecting that *all* the species of *Laphria* are not plump and bee-like. We fail to see the force of the objection. It is sufficient for our purpose, and quite obvious to observers generally, that *certain* species of *Laphria* resemble the Humble Bee. By a strange mishap Mr. Walsh derives from our remarks just the idea we wished to convey; i. e. that certain exceptional Diptera, that is, those forms among the least characteristic of the sub-order, copy the *Bombus*-form, but that neither do *all* the Diptera, nor *all* the species of *Laphria*, ever necessarily imitate the Humble Bee.

Our author truly remarks that all the species of *Bombus* are not yellow and black, but that some are "red and black," and also that some *Laphriæ* are likewise "red and black" as well as "fulvous and

\* Günther's Zoological Review for 1864, p. 267.

† On Synthetic Types in Insects. *Bost. Journ. Nat. Hist.*, vol. 7, 1863, p. 580.

black." This is only carrying the analogies of *Laphria* to *Bombus* still farther.

"4th. *Hirsuties* is by [no] means universal in all *Laphria*,"—Walsh. Most assuredly not. The fact, that *some* happen to be so, and, therefore, resemble the *hirsute* Bees, is sufficient and all the better for our purpose.

We then seem to "harmonize" as to facts. Why then does Mr. Walsh persist in obstinately drawing the reverse inference, that the *Bombus* rather resembles *Laphria*? Does an Ape resemble a man, or does man copy the Ape's physiognomy? Why do our best Comparative Anatomists persist in speaking of the *Anthropoid* Apes, when they should rather be styled, according to the antipodal views of our critic, *Simioid* men. For the same reason, our critic should speak of a *whale-like* fish, a *Bat-like* bird, or a *caterpillar-like* worm.

Whether *Bittacus* resembles *Bittacomorpha*, rather than the reverse, is a delicate point, but we think it does. The Neuropterous *Bittacus* is an unusual form even in that suborder. On the other hand, the *Tipulidæ* are in some respects aberrant *Diptera*, and *Bittacomorpha* may therefore be considered an aberrant *Tipulid*. We look upon the House Fly, *Musca*, as the type of the *Diptera*, and *Libellula* as the Neuropterous type. Any divergence from these forms leads to a departure from the type of the group. Thus starting from the typical *Neuroptera*, i. e. the *Libellulidæ*\* and *Epheméridæ*, we soon come to the *Hymenoptera*-like *Termes*, the *Aphis*-like *Psocus*, the *Lepidopterous*-like *Ascalaphus*, and the *Myriapod*-like *Lepisma*.

All aberrant forms when well developed, show a constant tendency to assume the forms of the higher groups; or, if degraded in a marked degree, revert to the archetypal articulate form. In either case the progress is towards a higher or a lower form. The latter is the more exceptional, as the evolution and growth of all animals is upwards towards a more specialized, differentiated form.

There is then a valid reason why comprehensive, mimetic forms do not always, for simple biological reasons, assume the form of other insects with which they are associated in life. Though there are numerous instances where one species imitates another, from motives, so to speak, of self-protection, yet in the Animal Kingdom as a whole, this is subordinated to a deeper-seated tendency of all young organisms towards a perfection of the type to which they belong.

\* We should not feel authorized in using Fabricius' term *Odonata* for this family, which in his system was considered as a group equivalent in value to the rest of the *Neuroptera*, any more than to call the *Pulicidæ*, *Aphaniptera*, because they were once thought to be a group of the same value as all the rest of the *Diptera*.

## TWO NEW NORTH AMERICAN CECIDOMYIÆ.

BY BARON R. OSTEN SACKEN.

In August, 1866, being in Newport, Rhode Island, I observed a young tree of *Gleditchia triacanthos*, the leaves of which were quite conspicuously deformed. The single leaflets were folded in such a way as to assume the appearance of a pod, proportionate to their own size, or of a smaller pod, taking up only a part of the leaflet. (The outer side of the pod was the underside of the leaflet). Each pod contained two or three pale orange larvæ of *Cecidomyia*, with a very delicate, narrow breastbone. About the 10th of August, the gallflies began to escape in large numbers, the pupa-skins remaining attached to the outside of the gall. At the same time I noticed that the young terminal leaves on the branches with their leaflets as yet folded, began to show the characteristic pod-like swelling. This soon led to the discovery, that every one of these young leaflets contained two or three very small, whitish larvæ of *Cecidomyia*, evidently in the first stage of their growth. Were these larvæ the produce of the newly escaped gallflies, which might have inserted their eggs in the fold of the unopened leaflets and thus prevented them from unfolding? This question, as well as the further development of this (apparently) second brood of larvæ, I have not been able to investigate.

The gall seems to be exactly similar to that of *Cecid. pseudoacaciæ*, Fitch. (Reports, Vol. I, N. 331). But the gallfly, if Dr. Fitch's description be correct, is evidently different. It belongs to the genus *Cecidomyia* in the restricted sense of Loew and Winnertz, as it has the same number of joints in the antennæ of both sexes (compare *Mono-graphs of the N. A. Diptera*, vol. I, p. 175), and, moreover, to the first sub-division of the genus, in which the female antennæ have sessile joints.

*Cecidomyia gleditchiæ*, n. sp. ♂ ♀. Head blackish, a small tuft of pale hairs on the labrum; antennæ 2+12 jointed in both sexes; the ♂ antenna is long enough to reach a little beyond the root of the wing, moniliform (the single joints being connected by short pedicels), verticillate-pilose (the hairs being somewhat longer than the length of the globular joint together with its pedicel); the ♀ antennæ hardly reach beyond the root of the wings; joints sub-globular, sessile and hence, the verticillate character of the pubescence less apparent than in the male; hairs also shorter. Thorax blackish, the three stripes



indicated by a grayish efflorescence and their intervals by two black lines, which bear a longitudinal row of pale hairs; in the female, the underside of the thorax is reddish; feet gray, with a whitish lustre; wings gray, darker along the costal vein; neuration like fig. 1 in Monogr. etc. I. p. 174. Abdomen blackish, with pale hairs; in the female it is red, each segment bearing a transverse black stripe on the back. Length about 0.065 of an inch. This description was drawn from mature living specimens.

The immature specimens had a reddish thorax, pale brownish above, without indication of stripes; a black fringe of short hairs or scales along the anterior margin of the mesothorax was very apparent in the male, less distinct in the female.

Some time ago Mr. Wm. Couper in Quebec, sent me some specimens of a very pretty gall, which he discovered on *Spiræa salicifolia* and which I take occasion to describe here.

This gall, the as yet unknown insect of which I propose to call *Cecid. salicifoliæ* has, like the preceding gall, the shape of a pod, formed by the folding of the leaf along the midvein, and the bulging out of the sac thus formed, the outer margin of which is closely soldered. The largest of the pods which I have before me is a little over half an inch long and absorbs the whole leaf, except a narrow margin, projecting above the seam of the pod; the smaller pods occupy only a portion of the the leaf. Although the galls were dry, when they reached me, the larvæ in them were still alive.

I found a similar gall in Nahant in August, 1864, quite abundantly on *Spiræa tomentosa*. The young terminal leaves of this plant were folded up so as to assume a pod-like appearance and enclosed larvæ of *Cecidomyia*, but I am not certain whether these larvæ belong to the same species as that which deforms *Spiræa salicifolia* in Canada.

Among the European *Cecidomyiæ* only one is known to affect the genus *Spiræa*; it is *Cec. ulmaræ* Bremi, which produces wartlike galls on the leaves of *Spiræa ulmaria*. (Winnertz, Linn. Entom. Vol. VIII. p. 240.)

## NOTES ON THYRIDOPTERYX EPHEMERÆFORMIS.

BY BRACKENRIDGE CLEMENS, M. D.

Some cocoons were sent to Entomological Society from London Grove, Chester county, Pennsylvania, found suspended from the small branches of the Norway Fir about the first week in August. The larvæ were about  $\frac{1}{4}$  inch long, varying in color from brown to nearly black; the head and three [succeeding?] rings were whitish mottled with black or dark olive. The first imago came out on the 10th of October. The cocoons are covered exteriorly with the diverging terminal leaves of the Norway Fir.

In order to name this insect we find ourselves compelled to ask a question propounded by Mr. Stephens in the Transactions of London Entomological Society as long ago as 1834, viz: "What is *Sphinx ephemeraeformis* of Haworth?" It appears that the insect so named was originally in the collection of Drury and when this was sold it passed into the possession of Haworth and thence into the care of his friend Stephens, at which time it was in a state of considerable mutilation. Stephens records that it was captured in England fifty years before his article was written. But this must have been an error, for it has never been found there since the reported capture, and is not now recorded as a British species.

Being really an American insect, the writings of our American entomologists have occasioned no little confusion, and made a reply difficult to the question answered by Stephens in 1834, very clearly and satisfactorily, notwithstanding the mutilated condition of his specimen.

Mr. Stephens generic description and the figure accompanying his article already referred to, leaves no doubt of the specific identity of the specimens sent by Mr. Wickersham and that to which he refers. The following is the generic diagnosis given subsequently in his "Ill. Brit. Ent. Haust.," Vol. IV, which we select as preferable to that given in the "Trans. Ent. Society of London."

"Antennæ short, deeply pectinated on both sides at the base, and apparently simple at the apex; head small; eyes globose; rather prominent; thorax very robust; abdomen also robust at the base and gradually attenuated to the apex; wings completely hyaline; anterior

elongate lanceolate, discoidal areolet closed, and with a longitudinal nervure; *first and fourth marginal nervures furcate*; posterior wings small."

Stephens gave to this genus the name THYRIDOPTERYX.

In the "Synopsis of the Bombycidae of the United States by Dr. A. S. Packard," another group is mistaken for this of Stephens and *Thyridopteryx ephemeræformis* of Haworth is tabulated as *Æceticus coniferarum* Harris, MS.

Mr. Grote in a subsequent paper, "Notes on the Bombycidae of Cuba," (Proc. Ent. Soc. Dec. 1865, p. 246), while very properly rejecting Dr. Packard's determination, places the insect in a new genus *Hymenopsyche* and upon rather unstable ground erects an additional species. He gives an excellent description of the neururation of the species, but misnames the subcostal nerve of the hind wings the "costal;" the hind wings are without a costal nervure. He notices the peculiarity alluded to by Stephens that "the first and fourth marginal nervures are furcate," but this is merely an individual peculiarity in some specimens, in which the medio-superior nervule is occasionally furcate at the extreme tip.

Stephens specimen was doubtless nearly or quite denuded, the antennæ were injured and the hind wings were almost entirely destroyed, and yet his generic description is sufficiently graphic, together with the description and figure given, to identify it at once with *Hymenopsyche* of Grote.

The synonymy of this species would therefore stand as follows:

THYRIDOPTERYX EPHEMERÆFORMIS.

*Sphinx Ephemeræformis*, Haw., Lep. Brit. 72.

*Egeria Ephemeræformis*, Haw., Ill. Brit. Ent. Haust. 1. 145.

*Thyridopteryx Ephemeræformis* Stephens, Trans. Ent. Soc. Lond. Vol. I, p. 76, pl. 10, f. 1. Ill. Brit. Ent. Haust. Vol. IV. Doubleday, on some N. American Lep., Entomologist, p. 97. Grosse, Zool. II, 537. Walker, Cat. Brit. Mus. IV. 959, 60.

*Æceticus coniferarum* Packard, Proc. Ent. Soc. Phila., Nov. 1864, p. 351.

*Hymenopsyche coniferarum* and *thoracicum*? Grote, Proc. Ent. Soc. Phila. Dec. 1865, p. 248.

On the Insects, COLEOPTEROUS, HYMENOPTEROUS and DIPTEROUS, inhabiting the Galls of certain species of Willow.—Part 2d and last.

BY BENJ. D. WALSH, M. A.

DIPTERA.—SUPPLEMENT.

GALLMAKERS.—Genus **CECIDOMYIA**, Subgenus **CECIDOMYIA**.

No. 3. GALL *S. STROBILISCUS* Walsh.—I described this gall from a single dried specimen found by Mr. Bebb on *Salix rostrata* in North Illinois. I have since found very numerous specimens of what for the present I regard as the same gall on *S. discolor* near Rock Island, Ill. Of 23 gathered March 23d one was undistinguishable from the *S. rostrata* gall; the rest had the tips of the external leaves (except at the tip of the gall) not angulated, but more or less rounded with a subobsolete midrib outside which terminated in a minute tooth or beak. In other respects they did not differ, and especially in the veins on the inside of the leaves being obsolete or subobsolete. The general outline of this gall was ovate lanceolate, rarely ovate; length—rejecting one stunted specimen, which however contained a larva—1.05—1.65 inch, diameter .57—.72 inch. The stunted specimen was not porrect, but deflected at an angle with the axis of the twig, and I subsequently found a few others varying in the same way. In one gall I met with 2 or 3 of the same *Orchelimum* eggs which occur so copiously in *S. strobiloides* O. S., and May 26th I bred several *Orchelimum* larvæ from these galls.

The LARVA and PUPA, as well as the pupal integument, are undistinguishable from those of *S. strobiloides* O. S., but the cocoon is shorter, being only 1½—2 times as long as the larva, instead of 2½—3 times as long: 2 larvæ and 2 pupæ examined April 9.

IMAGO. *CECIDOMYIA* s. *STROBILISCUS* n. sp.—Differs from *Cec. s. strobiloides*, Walsh, only in the ♂ antennæ being 23—24-jointed, (not 21—22-jointed,) with 1 or 3 of the terminal joints sessile and the right and left antenna varying in the same ♂ in the number of joints; and in the origin of the anterior branch of the 3rd longitudinal wing-vein being usually pretty distinct. Hence it can scarcely be separated from *Cec. s. rhodoides* Walsh, though the galls are quite different. One ♂, eleven ♀, bred April 30—May 8.

No. 4. GALL *S. GNAPHALIOIDES* Walsh.—I found a single specimen

on a bush of *S. discolor* growing among numerous *S. humilis*, on which last willow alone this gall had previously occurred. A very similar gall, but differing in the tips of the leaves not being beaked, was gathered on *S. candida* by Dr. Geo. Vasey, in Illinois. I have 3 dried specimens of it from Mr. Bebb.

No. 5. *CECIDOMYIA S. RHODOIDES* Walsh.—A ♂ bred in 1865 had 24-jointed antennæ, counted while recent. The other 8 ♂ bred in 1864 had 23—25-jointed antennæ. Within certain limits the number of joints in the Cecidomyioidous ♂ antenna seems to be constant, and to differ often in different species.

No. 6. GALL *S. CORYLOIDES* Walsh.—I have since found two additional specimens in a different locality, and as before on *S. discolor*. Thus, in addition to the occurrence of two very distinct but closely allied bud-galls on the same species of Willow, *S. humilis*, viz : *S. rhodoïdes* and *S. gnaphalioides*, we find two very distinct but closely allied bud-galls on the same species of Willow, *S. discolor*, viz : *S. strobiliscus* and *S. coryloides*.

No. 7. *CECIDOMYIA S. CORNU* n. sp.—(The larva only known before.) ♂ ♀. Scarcely differ from *Cec. s. batatas* Walsh, except in the antennæ ♂ being rather shorter and 21-jointed (counted when recent) with the last joint sessile or connate with the preceding, not 18—19 jointed. Two ♂, 3 ♀, bred May 1-9. In the pupal integument the tips of the antennal horns are scarcely, and the thoracic bristles not at all black, while they are conspicuously so in *Cec. s. batatas*; and the larva, as already shown, has a Y-shaped, not as in *Cec. s. batatas*, a clove-shaped breast-bone.

No. 8. GALL *S. SILIQUA* Walsh.—Besides the single one found on *S. discolor*, I have since found about a dozen others on that Willow, and received through Mr. Bebb over a dozen gathered on that Willow in New Hampshire by the Rev. W. J. Blake. They can only be distinguished from galls found on *S. humilis* by their uniformly larger size, which may be due to the rank growth of this species of Willow. Mr. Blake also sent me many specimens of this same gall gathered on *S. rostrata* in New Hampshire, which were about the same size as those found on *S. cordata*; and I have a single dried specimen gathered in Illinois on *S. petiolaris* by Mr. Bebb. Thus we have what seems to be the same gall growing on six different Willows, *S. humilis*, *S. discolor*, *S. rostrata*, *S. cordata*, (= *S. rigida*), *S. petiolaris*, and according to Dr. Fitch on *S. lucida*. I said (*Proc. etc.* III. p. 592) that the terminal beak of this gall is never recurved in speci-

mens growing on *S. humilis*; but in 1865 I found one such gall on *S. humilis*. In those growing on *S. rostrata* this is particularly common. It is singular that some galls should be thus found on many Willows, and others apparently be restricted to one species; but the same phenomenon occurs in *Cynipidæ*. In one of the public squares in Rock Island, Ill., there grow 30 or 40 trees of the exotic *S. alba*, and interspersed among them many bushes of the indigenous *S. longifolia* covered with their peculiar gall, *S. brassicoides* Walsh. Yet not a gall either of that kind or of any other kind, whether Cecidomyidous or Tenthredinidous, can be seen on the *S. alba* trees, even on the closest examination before and after the fall of the leaf.

IMAGO. *CECIDOMYIA S. SILIQUA* Walsh.—In 1864 I had bred only ♀♀ from galls found on *S. humilis*. I have since bred 3 ♂ from galls found on *S. humilis*, 1 ♀ from one of the New Hampshire galls found on *S. discolor*, and 4 ♂ 5 ♀ from Illinois galls found on *S. cordata*. They differ in no material respect except sexually; the ♂♂ having 20—22-jointed antennæ (counted when recent) constructed as in *C. s. brassicoides* with the last joint sometimes sessile, and a single ♂ having one antenna 21-jointed and the other 22-jointed. Hence, as I surmised, Dr. Fitch must have been mistaken in describing the ♀ [♂] antennæ as 16-jointed. On April 14 I compared a recent ♀ from a *S. discolor* gall with a recent ♀ from a *S. humilis* gall, and could see no difference; even the average size of the two insects being the same, though the *S. discolor* gall averages  $\frac{1}{2}$  larger every way. The pupal integuments are also colored in the same remarkable manner, no matter on what species of Willow the galls occur.

No. 9. GALL *S. TRITICOIDES* Walsh.—The LARVA on April 11 is .09—.10 inch long, about 3 times as long as wide, and fulvous with the usual whitish bowel-like markings. Breast-bone Y-shaped, as in *Cec. s. brassicoides* etc. Head very large, robustly conical, as long and as wide as an average segment is long, so that when it is retracted the anterior end of the body seems squarely truncate. The entire cell, including the beak formed by the bud, is .50 inch long and .05 inch wide, the cocoon nearly the size of the cell, but free throughout and not agglutinated to it. One cocoon extracted whole contained a larva lying with its head a little behind the central point of the cocoon. Two specimens.

No. 12. GALL *S. BATATAS* Walsh.—Since 1864 I have found many more of these galls on *S. discolor*, several of them of the smooth

potato-like type, and bred from them, April 16—21, 33 ♀ without a single ♂ among them, which differ in no wise from ♀ ♀ bred from galls found on *S. humilis*. I observe that in this species there is an indistinct whitish-cinereous very narrow orbit behind the eye, representing the broader and very conspicuous white orbit found in the inquiline *Cec. orbitalis* Walsh. From these *S. discolor* galls I also bred the *Decatoma* reared in such abundance from the *S. humilis* galls.

No. 13. GALL *S. VERRUCA* Walsh.—Oct. 11th I found several of these galls on *S. discolor*, undistinguishable from those found on the closely allied *S. humilis*. The LARVA was orange-color with the usual whitish bowel-like markings, .08 inch long, 2½—3 times as long as wide, depressed, with a large head. Breast-bone black, elongate-semioval and rather longer than wide. Two specimens. Thus we have no less than 4 species of Cecidomyidous galls common to the two closely-allied Willows, *S. discolor* and *S. humilis*, viz: *S. gnaphalioides*, *S. siliqua*, *S. batatas* and *S. verruca*.

No. 14. GALL *S. SEMEN* Walsh.—This is not a Cecidomyidous, but an Acaridous gall, and is constructed on the same principle as 15 or 16 others with which I have become acquainted, all growing on the upper side for the most part of the leaf of various trees, and composed of a more or less elongate sack opening below by a more or less closed aperture, and on its interior surface covered with rough excrescences of different shapes. On the other hand, all Cecidomyidous galls known to me are smooth and free from excrescences inside. From most of these Acaridous galls the mites escape through the aperture below, but in some, e. g. *Cerasi crumena* Walsh MS, on *Cerasus serotina*, the gall always bursts open above as in *Sulicis semen*. Similar, but not identical, galls are found on several other Willows. On Aug. 25 I found in one of these *S. semen* galls, which was about .03 inch in diameter, as many as 40 or 50 hyaline-whitish young *Acarus*, which, as is usual, were much more elongate than the perfect Mite. Hence it may be readily understood how minute their size is, and how liable they are to be overlooked, except under a very powerful lens, especially as, unlike the perfect Mite, they are very dull and sluggish in their motions, which indeed seems to be the universal rule with all the larvæ of the Gall-making Mites. The perfect Mite, which was found on the same day in other galls, is hyaline-whitish with antenniform front legs as long as its other legs, which front legs it elevates in the air and constantly vibrates up and down as it runs. Those found in galls on other trees

differ but little in size, structure or color, some species however being spotted. In a few galls, e. g. *Cratægi vermiculus* Walsh MS, which occurs abundantly both on *Cratægus tomentosa* and *Cr. crus-galli*, the larvæ of the mite are of a pale pink color.

No. 15. GALL *S. ÆNIGMA* Walsh.—I have little doubt that this gall also is a deformation produced by an *Acarus*. From its great scarcity in 1866, I was unable to examine any green specimens, but on Aug. 27 I found among the crumpled exterior surface of a partly dried-up specimen a half-grown *Acarus* similar to those found in *S. semen*. It may be stated that on the tree from which this gall was procured there were no *S. semen* galls; for this gall too, as well as *S. ænigma*, though so exorbitantly abundant in 1864 has been comparatively quite scarce in 1866. Usually in Acaridous galls the larvæ live in a hollow inside; but in one on the leaf-stalk of the Black Walnut—*Juglandis caulis* Walsh MS—they reside among the brown external woolly pubescence, just as in *S. ænigma* they probably reside in the crumpled external surface of that gall. The Cecidomyidous larvæ that I found in June and August in *S. ænigma* were most likely inquilines. (*Proc. etc.* III. pp. 608—9.) I have received through Mr. Bebb from G. W. Clinton, Esq., Buffalo, N. Y., pressed specimens of this gall growing on the same Willow—*S. nigra*—on which I find it exclusively. Hence there are at least 3 Willow-galls common to the Eastern and the Western States—*S. strobiloides*, *S. siliqua*, and *S. ænigma*.

#### INQUILINES OR GUEST-FLIES.

Genus *CECIDOMYIA*, Subgenus *CECIDOMYIA*.

A. *CECIDOMYIA ALBOVITTATA* Walsh. On May 5 I bred a ♀ from the gall *S. strobiliscus* Walsh found on *S. discolor*.

D. *CECIDOMYIA ORBITALIS* Walsh. One ♂, one ♀, which may possibly belong to this species, and which must have come out since May 14, were found May 26 dead and dry in a jar containing many of the Tenthredinidous galls *S. gemma* n. sp. They are a little smaller than my smallest *orbitalis*, and the ♂ has 17-jointed, not 18—19-jointed antennæ, with the pedicels on their basal  $\frac{1}{2}$  about as long as the globular part of each joint; otherwise, so far as can well be ascertained from the dried specimens, they do not differ materially, though I incline to believe them distinct from the difference in their pedicels.

Genus *CECIDOMYIA*, Subgenus *DIPLOSIS*.

D. *DIPLOSIS ATROULARIS* Walsh.—I bred a single ♂ Sept. 27th



from the Cynipidous gall *Q. ficus* Fitch of the same year's growth. From another Cynipidous gall of the last year's growth, *Q. prunus* Walsh, I bred May 26 1 ♂ 1 ♀ of an undescribed *Cecidomyia* about the size of *orbitalis* Walsh. I believe that these two and a third already mentioned by me (*Proc. etc.* III, p. 549) are the only recorded cases of *Cecidomyidæ* being inquiline in Cynipidous galls.

*G. DIPLOSIS SEPTEMMACULATA* Walsh.—I bred a single ♀ August 23rd from recent Black-knot found on the wild plum. From the Coccidan gall *Vitifoliæ* Fitch (see the *Practical Entomologist* I. pp. 111—2, and II. p. 19.) I bred Aug. 12—20 3 ♂ and very numerous ♀ of this species. Hence, if I am correct as to the fungoid nature of Black-knot, (see *Practical Entomologist* I. pp. 48—51,) the same Guest Gall-gnat sometimes on the one hand breeds in *Cecidomyidous* or Coccidan galls, sometimes on the other hand breeds in a fungus, when, properly speaking, it ceases to be a Guest Gall-gnat.

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On p. 562 of the first part of the Paper, I called in question certain supposed assertions of Harris and Fitch, as to the larva of *Cecidomyia* transforming gradually into the pupa state, by a kind of budding process, without moulting the larval integument, quoting Harris's book as authority. It now appears that Dr. Fitch's views on this subject must have been misunderstood by Dr. Harris, or else that they have been subsequently modified. For in the 3rd volume of the *N. Y. Reports* (p. 65) all that Dr. Fitch asserts is, that the larval integument in *Cecidomyia* is shuffled off towards the tail of the future pupa, and is there "broken into shreds and flakes which the motions of the pupa cause to separate and drop off," though on the back of the insect "he was unable to detect any exfoliation whatever." Thus nearly the whole peculiarity of the process reduces itself to this, that instead of the larval integument being moulted whole, as with almost all other insects, it is moulted piecemeal. I can readily believe this to be so with the Willow *Cecidomyia*, because I have never detected in their pupal cocoons any complete integument. But in the case of a large undescribed species of *Diplosis* (*D. helianthi-bulla* Walsh MS.) which makes a globular sessile hollow gall about the size of a large pea on the leaves of *Helianthus*, I have repeatedly found in the gall along with the pupa a complete larval integument, as large in comparison with the size of the insect as that of any Lepidopterous pupa. In this particular case, therefore, the larval integument cannot be moulted piecemeal.

On p 569 of the same Paper I also showed, that Harris must have been mistaken in supposing, that the larva of the Wheat-midge formed no cocoon when it went underground. Dr. Fitch, on p. 60 of the volume above referred to, explains how he made the interesting discovery, that these larvæ really do inclose themselves in cocoons, agglutinated to the earth just as I had suggested; and that "they do not remain naked in the ground, as he had all along supposed them to." The Wheat-midge, by the way, as is abundantly evident from Harris's and Fitch's descriptions and figures, is a true *Diplosis*, and consequently its correct name is *Diplosis tritici*, Kirby. In consequence partly of the ♂ having been unknown to European authors, it is erroneously referred to the subgenus *Cecidomyia*, instead of to that of *Diplosis*, by all authors known to me, including Osten Sacken. (*Dipt. N. A.* p. 189.) The Hessian Fly, on the contrary, (*C. destructor* Say) really does belong to the subgenus *Cecidomyia*.

The "two small oval lamellæ" described by Winnertz as attached to the oviduct of a European *Diplosis*, and suspected by me (*Proc. &c.* III. p. 556) to be nothing but two eggs protruding, I have since noticed in several *Diplosis*, when the oviduct is exerted to its utmost length; and they are not eggs but true parts of the oviduct.

#### HYMENOPTERA.—Family TENTHREDINIDÆ.

For the sake of scientific precision, it may be as well to touch upon a few points relative to the Natural History of this family.

I. Authors originally described the Tenthredinidous abdomen as 9-jointed in both sexes. (*Latr. Gen. Cr. Insect.*, III. p. 225.) Westwood first proved, that what had been previously considered as the 1st abdominal joint was in reality the metathoracic postscutellum, and consequently that the abdomen here was really not 9-jointed but 8-jointed. (*Introd.* II. p. 92.) And it is difficult to see how any one could come to any other conclusion, after examining a *Cimbex*, a *Hylotoma*, a *Lyda*, a *Cephus*, a *Lophyrus*, a *Euura* or a *Nematus*. For in all these genera there is a large surface of membrane between the so-called 1st and 2nd abdominal joints, occupying the whole gaping suture in *Cimbex* and *Hylotoma*, and a more or less transverse triangular space on the dorsum in the other five genera; which membranous space I call everywhere "the basal membrane." And besides, in other genera (*Tenthredo*, *Dolerus*, *Emphytus* etc.) the so-called 1st joint is split along the dorsal line; and it is every where the ventral arc corresponding to this so-called 1st dorsal joint of the abdomen which bears the hind legs, and which must necessarily therefore be metathoracic.

Mr. Norton, although he fully recognizes the fact of the supposed 1st abdominal joint being metathoracic, and calls it in his descriptions sometimes the "basal plates" and sometimes the "basal membrane," yet has assumed the existence of an imaginary 1st abdominal joint, "which is often concealed by the basal plates of the metathorax," so as to make up the full number of 9 abdominal joints.\* Any one, however, can readily see that this imaginary 1st joint is not found in nature; and some of Mr. Norton's descriptions, in consequence of this recognition of a nonentity, are difficult to understand. For example, in *Tenthredo 14-punctata* Nort. we read "a broad stripe through the middle of 7 basal segments of abdomen, and seven dots [one dot?] on each side near the base of each, black." (*Proc. Ent. Soc. Phil. I.* p. 143.) Is the imaginary 1st abdominal joint included in these "7 basal joints," or is it not? And if it is, does it bear a broad dorsal black stripe and a black dot on each side? The truth of the matter, I suppose, is, that this author has mistaken what I call the "basal membrane" for a rudimental 1st abdominal joint. But as this "basal membrane" is no part of the external horny skeleton, and is always, so far as I have observed, of a homogeneous color, it can scarcely be marked in the manner inferred by the above description; and most probably it is the 7 basal segments in the Westwoodian sense, not the 7 basal segments in the Nortonian sense, that are in reality striped and spotted with black in *Tenthredo 14-punctata*. Moreover not only does Mr. Norton somewhat incongruously use the terms "basal plates," and "basal membrane" as synonymous, (*Proc. B. S. N. H.* 1860, pp. 237, 240, 241, 242, 244, 246, 248, 250, 253, &c.,) but he repeatedly describes the true "basal membrane" as a spot on the 1st abdominal joint; (*ibid.* 1861, pp. 159, 160, 161, &c.;) whereas in reality it forms no part whatever of any abdominal joint, but simply connects the metathorax with the abdomen, and like most other connecting membranes is not spotted, but of a uniform color.

\* *Proc. Bost. Soc. Nat. Hist.* 1862, p. 117 note, and compare the description of *Allantus dubius*, *ibid.* 1860 p. 241, where he speaks of "the fifth, seventh, and two apical segments of the abdomen," and that of *Tenthredo semirufus*, *Proc. Ent. Soc. Phil.* III. p. 12. Strictly speaking, these "basal plates" ought to be called "terminal plates;" for they are placed at the *tip*, not at the *base*, of the metathorax, the anterior end of the mesothoracic scutellum being generally in insects considered as the centre of polarity. But it is better to use an established phrase, even though it be somewhat incorrect, than to create confusion by changing it. Probably the original author of the term considered the "basal plates" as appertaining to the abdomen; and of course, in regard to the abdomen, they are really basal.

This so-called 1st abdominal joint in *Tenthredinidæ* and *Uroceridæ* is manifestly homologous with the posterior subsegment of what is generally considered as the metathorax in other Hymenoptera; and Latreille, Audouin and Schaum, believing that it was abdominal, maintained that therefore the two were both of them abdominal and not thoracic, while Westwood rightly, in my opinion, contended that both were thoracic. In a recent Paper (*Proc. B. S. N. H.* 1866, pp. 279—295) Dr. Packard, although he endorses Westwood's theory on this matter, (p. 282.) asserts that during the development of the pupa of *Bombus* from the larva, and before the final moulting of the larval integument "the basal ring of the abdomen is plainly seen to be transferred from the abdomen to the thorax." (p. 282.)\* He might as well assert that, during the process of pulling off a fine network glove from the hand of a lady, the fingers are plainly seen to be transferred to the palm of the hand. Because the metathorax of the future pupa is seen, through the transparent integument of the larva, to underlie at this particular time the basal ring of the larval abdomen, it by no means follows that the former originates and is developed from the latter. Dr. Packard himself allows, that at this particular time the head of the future pupa underlies conjointly the head and the 1st thoracic segment of the larva; (p. 280;) yet he fully agrees with Westwood in repudiating the inference drawn therefrom by Dr. Ratzeburg, that the head of the pupa is formed conjointly out of the head and the 1st thoracic segment of the larva. (p. 280, note.) Surely, if such proof is good for nothing in the one case, it ought to be good for nothing in the other case as well. But then, if Dr. Packard had been consistent in his reasoning here, he would have missed what he considers a notable exemplification of Prof. Dana's theory of cephalization. (pp. 282 and 286.) Unfortunately, however, he cannot be consistent with himself, even for a dozen consecutive pages. On page 283 he says, that the moult into the pupa state takes place in what he calls the 3rd stage; on page 295 he says, that it takes place in what he calls the 2nd stage. It evidently takes place in passing from his so-called 1st stage to his so-called 2nd stage; and the 1st stage of what he calls the semi-pupa, (fig. 1, Packard,) is the larva, and the stages 2—4 (figs. 2—4, Packard) are the pupa, in gradually progressive stages of development; and all his voluminous distinctions between the semi-pupa and pupa states, and the dogmatic assertion (p. 286) that "the terms larva, pupa and imago are not absolute terms," are merely darkening coun-

\* See also *Proc. etc.* VI. p. 44, where the same doctrines are re-asserted.

sel. He might as well draw three or four pictures of the gradually progressive stages of development of the imago of a moth or a butterfly, after it has emerged from the pupal integument, the wings, &c. being gradually more and more developed in each successive stage, and then dignify these stages with the high-sounding names of the successive stages of the semi-imago. In all those Orders where the pupa is quiescent (Coleoptera, Neuroptera in the Erichsonian sense, Hymenoptera, Lepidoptera and Diptera,) there are two grand and trenchant distinctions between the larva and the pupa: 1st, that the former has not yet moulted the larval integument and the latter has; and 2nd, that—as has been well pointed out by Schaum (*Ann. and Mag. Nat. Hist.*, London, 1863, p. 178, note.)—the former has the mouth and anus externally open, and can consequently both eat and discharge *fæces*, and the latter has the mouth and anus externally closed by the pupal integument, and consequently can neither eat nor discharge *fæces*.\* Now, although we cannot apply the second of these two criteria to those Orders which have an active pupa, (Orthoptera, including Pseudoneuroptera, Heteroptera and Homoptera,) because in these the mouth and anus are never closed at all, yet here we may plainly distinguish the pupa state by the homology of the moultings with those of the Orders which have a quiescent pupa. For the pupa state here, is evidently the period intermediate between the penultimate and the ultimate moult, just as it is in the other case; the ultimate moult, however, here, as in the other case, involving the rejection of two integuments, which are generally almost simultaneously rejected, but in Ephemeridæ are rejected at a considerable interval of time. It is singular that, in a Paper professing to treat of the development and morphology of Hymenoptera, this grand fundamental distinction of Dr. Schaum's and others, has not once been even alluded to by Dr. Packard.

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\* In some of these Orders there is, in addition, a third criterion—which, however, often admits of exceptions—namely, a difference in the legs of the larva and pupa. For example, in Lepidoptera the larval legs when present, which is not universally the case, are free; while the pupal legs are always present, and are usually soldered to the body, except in the leaf-mining genus *Micropteryx*, where they are free. (Stainton's *Entom. Annual*, 1863, figs. 8 and 8\*, &c.) On the other hand, in Coleoptera and Hymenoptera the larval legs when present are free, and the pupal legs are always present and usually free, except in certain Brachelytrous Coleoptera and Chalcidian Hymenoptera, where the pupal legs are present, but the pupa is as much "obtect" as that of any moth, as I have myself observed and as was long ago stated by Westwood. (*Introduct.*, pp. 20 and 37; II, pp. 78—9.)

I say nothing here of the manifestly erroneous assertion, made by Dr. Packard, on p. 282, of the Paper above referred to, in regard to Baron Osten Sacken's belief on the subject of this so-called 1st abdominal segment, (where, by the way, the excellent Articles of that author on *Cynipidæ* are quoted as occurring in Vols. II and III of these *Proceedings*, instead of Vols. I, II and IV,) because the Baron is abundantly able to fight his own battles. The whole Paper indeed, like most of Dr. Packard's other writings, is full of sweeping generalizations, which are utterly unsupported by facts, and which greatly detract from the value of his investigations. For example, it is asserted that in the Honey-bee "we find the head larger and the abdomen smaller in proportion than in other insects." (p. 291.) As if *Brachygaster*, and *Crabro*, and *Lyrops*, and *Chalcis*, and *Perilampus*, and many other Hymenopterous genera, to say nothing of the other Orders, had not much smaller abdomens in proportion to the size of their heads than *Apis*! Again, on p. 292, he asserts, that "Neuroptera" [including in his sense of the term Pseudoneuroptera,] "are, as a whole, water insects;" when the fact is, that 1 of the 11 families into which Westwood divides the Order, (*Sialidæ*), is aquatic in the larva state only; 3 are aquatic in the larva and pupa states only, (viz.: *Perluidæ*, *Ephemeridæ* and *Libellulidæ*;) and the remaining 7 are not aquatic at all. And if we accept Dr. Hagen's arrangement, we find 1 family (*Sialidæ*) aquatic in the larva state only; 4 aquatic in the larva and pupa states only, (viz.: *Perluidæ*, *Ephemeridæ*, *Libellulidæ* and *Phryganeidæ*;) and the remaining 5 not aquatic at all. And if with Dr. Packard we add *Thysanura* to the Order, there will be no less than six out of 11 families that are not aquatic in any of their states. Again, on p. 292 he says, that the Bees, and Hymenoptera in general, are not carnivorous in their habits; whereas, whether we consider the number of genera or of species, much more than one half of the whole Order belongs to the parasitic families, *Ichneumonidæ*, *Chalcididæ*, &c. And on the very same page he asserts that Neuroptera, including Pseudoneuroptera, are all of them carnivorous; whereas *Termidæ* are certainly not so, and, with a few exceptions, perhaps, *Perluidæ* and *Ephemeridæ* and *Phryganeidæ* are all of them vegetable feeders. In the same manner in the *Maine Scientific Report*, (1863, p. 147,) he asserts it to be generally true of all insects, that the ♂ has one abdominal joint more than the ♀, because, forsooth, this is generally though not universally true of Hymenoptera Aculeata. Moreover, in the *Practical Entomologist*, (I, p. 75,) he asserts that in the Crab

and the Lobster, the gills are attached to the legs on the outside of the body, because, I suppose, he had read that this was the case with certain inferior Crustacea. And, on the same page, he asserts that *Ephemeridæ* are among the hugest of insects and lay but few eggs!! And again, on the very same page, he asserts that *small* size is correlated with superiority of grade, apparently because a Bee is smaller than a Butterfly, Prof. Dana having asserted the very reverse, viz: that *large* size is correlated with superiority of grade, apparently because a Lobster is bigger than a Shrimp, and each author seeing only the examples that make in favor of his own hypothesis, and blindly shutting his eyes to those which make against it; the real truth being that size has nothing whatever to do with the matter. Such hasty and sweeping generalizations remind us of the philosopher quoted in one of Macaulay's Reviews, (p. 282, Amer. Ed.,) who inferred from a few examples carelessly collated, that all men with two given or Christian names were necessarily Jacobins and Disorganizers, and all men with a single given name were inevitably, in spite of themselves, Tories and Conservatives. In both cases, we have but to take a large number of examples, in order to show the utter fallaciousness of the so-called laws.

It is singular that, while Latreille described the Tenthredinoid abdomen as 9-jointed, and Westwood as 8-jointed, neither author seems to have perceived that throughout the family, with one remarkable exception, the ♂ venter is not 8-jointed, but 7-jointed. Yet such is the fact, and we have but to open our eyes in order to perceive it. In ♂ *Tenthredo*, *Nematus*, *Trichiosoma*, &c., there are typically 8 dorsal joints to the abdomen, 1—7 each bearing a spiracle on its lateral surface, and 8 being small, and usually so much retracted as to be invisible, more especially in the dried specimen, so that the dorsum is often seemingly 7-jointed. As is almost universally the case in Insects—though *Cynipidæ* form a notable exception—the ventral joints in these groups lie opposite to the corresponding dorsal joints, and we find ventral joints 1—6 lying exactly opposite to dorsal joints 1—6, while opposite the two dorsal joints 7 and 8, or the one joint 7, if 8 as usual be retracted, there lies only the one large terminal ventral joint 7.\* On the contrary, in all ♂ *Hylotomides*, although there are the same number of dorsal joints as in the other Tenthredinoid groups,

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\* This arrangement may be seen most plainly in such species as have the tip of the abdomen differently colored from the rest of it, both above and below, e. g. *Tenthredo* (*Allantus*) *verticalis*, Say.

and similarly arranged, except that the 8th dorsal joint is larger and is scarcely ever retracted, yet there are always 8 complete ventral joints, 1—6, as before, lying opposite to the dorsal joints 1—6, while opposite 7 and 8 there lie, not one but two joints, viz: joint 7, which is nearly as large as those immediately preceding it, and joint 8, which is very much larger and nearly as large as the large terminal or 7th joint in ♂ *Tenthredo*, &c. Evidently the typical number of ventral joints throughout the whole family is 8; but in ♂ *Tenthredo*, &c., joints 7 and 8 are confluent, so as to become apparently one joint.

In all ♀ *Tenthredinidæ* the abdominal dorsum is 8-jointed, 1—7 bearing a spiracle as in ♂, and 8 being rather small, yet very distinct; but, as in all other Terebrantia, the venter has only six complete joints, the ovipositor and its sheaths taking their origin from under the tip of joint 6, so as to obliterate more or less completely the remaining ventral joints, and being laterally fringed by the overlapping part of the dorsal joints 7 and 8. This overlapping part is found ♂ ♀ in every dorsal joint—being generally in *Tenthredinidæ* distinctly separated by an acute angulation from the dorsal surface and bearing the spiracle in joints 1—7—and has been called throughout in my descriptions “the lateral plate.” In reality, this part, as I have observed in Pseudoneuroptera, (*Proc. &c.*, II. p. 250, &c.) is homologous with the “pleura” of the thoracic segments. Westwood indeed describes and figures a small piece (7+), laterally attached to the tip of the 6th ventral in ♀ *Trichosoma*, as a true 7th ventral. (*Introd.* II, p. 94, figs. 12 and 18.) But on the most careful examination I can detect no such piece in ♀ *Cimbex* or any other Tenthredinidous ♀, though in ♀ *Cimbex* there is a hole or excavation in the spot occupied by his piece “7+.” In *Uroceridæ*, it is true, there is a very distinct, small, transverse lateral piece corresponding to the Westwoodian “7+,” which is no doubt a rudimentary 7th ventral, and is figured but not numbered or lettered by Westwood. (*Ibid.* p. 115, fig. 13.) But in the allied family *Ichneumonidæ* he neither describes nor figures any such piece, nor can I discover any such myself. Here, therefore, it might be inferred that this author would describe the ♀ venter as 6-jointed. No such thing. In this family he obtains the additional 7th ventral in ♀, not at the tip, but at the base of the venter. For in describing and figuring the ♀ venter of the Ichneumonidous genus *Pimpla* as 7-jointed, not 6-jointed, he has been deceived into considering the 1st ventral joint as two joints, because its basal portion is enwrapped by the horny dorsal joint 1, so as to form a short robust peduncle, the whole of which, both



above and below, is of a much more horny consistence than the true ventral joints. And to carry out his error the more plausibly he figures the ventral joints as dislocated from the dorsal joints. (*Introd.* II, p. 138, fig. 8, and p. 139.) Whereas, we have but to recur to Nature to see that his so-called 7th ventral (the true 6th) is not dislocated from, but lies exactly opposite to the 6th dorsal; his so-called 6th ventral (the true 5th) is not dislocated from, but lies exactly opposite to the 5th dorsal; and so on till we come to his so-called 2nd ventral, (the true 1st,) which lies with its tip opposite to the tip of the 1st dorsal, and in *Pimpla* is pretty long, but in such genera as have a moderate or a long peduncle (*Cryptus*, *Ophion*, &c.) is moderate or short. It may be added, that throughout *Ichneumonidæ* precisely as in *Tenthredinidæ*, the dorsal joints 1—7 bear a spiracle ♂ ♀ on their lateral surface.

In one word in *Ichneumonidæ* the ♀ venter is invariably 6-jointed, with its joints corresponding with joints 1—6 of the dorsum, while on the contrary the ♂ venter is invariably 8-jointed, although in many genera the two terminal joints are more or less retracted, or overlapped and concealed by the "lateral plates" of the terminal joints of the dorsum. Hence in species with a very short ovipositor, if we can count the ventral joints we can always distinguish the sex, and if there are more than 6 of them visible the specimen must be ♂. Of course, care must be taken not to count ventral joint 1 as two joints.

I have dwelt at perhaps undue length upon these points, because they are not only in themselves of theoretical importance, but in Descriptive Entomology it is of real practical moment, when it is stated that such and such abdominal joints are colored differently from the rest, to know which particular joints are designated by the describer as being thus colored. What Westwood and Norton consider as part of the metathorax in *Tenthredinidæ*, other writers call the 1st joint of the abdominal dorsum; and what Norton generally calls the 2nd joint of the abdomen Westwood calls the first. For my own part, I agree with Westwood throughout upon this matter. There has been a similar confusion in Pseudoneuroptera, where in *Odonata* and *Epheméridæ* some authors have described the abdomen as 10-jointed and some as 9-jointed; the truth being, as I have pointed out, (*Proc.* &c. II, pp. 190—1,) that the so-called 1st joint of the 10-jointed abdomen is in these two families really metathoracic. Moreover, in those *Ichneumonidous* genera that have very short ovipositors, authors have long recognised the difficulty of distinguishing the sexes; and I know of no

way in which this can be so readily and conveniently done, as by ascertaining the number of the ventral joints, viz: ♂ 8, ♀ 6.

II. In Mr. Norton's earlier papers on this family, probably through some clerical or typographical error, he speaks of *three* recurrent nervures, while in reality there are never more than *two* in the Hymenopterous wing. In his latest papers this is silently rectified. (Compare on the one hand *Proc. B. S. N. H.*, 1861, *G. Dosytheus* p. 151, *G. Emphytus* p. 154, *G. Nematus* p. 157, and *G. Selandria* p. 219, with on the other hand *Proc. B. S. N. H.*, 1862, *G. Tenthredo*, p. 116.)

III. The number of legs and prolegs in the Tenthredinidous larva appears to be often inconstant in a given genus. For example, some *Hylotoma* larvæ are 20-footed, some 18-footed; (*Westw. Introd.* II, p. 97;) some *Tenthredo* larvæ are 22-footed, some 20-footed; (*Ibid*;) and Mr. Norton, probably on the authority of Hartig, asserts the same thing of the larva of the allied genus or rather sub-genus *Selandria*. (*Proc. B. S. N. H.*, p. 219.) It has generally been stated that the larva of *Nematus* is always 20-footed; but unless I have been deceived in my *Nematus s. pisum*, n. sp., the larva in this genus is occasionally 18-footed, the anal prolegs being obsolete.

IV. Westwood, Dahlbom and Hartig, as quoted by Norton, divide the larvæ of the genus *Nematus* into three groups, *a*, Solitary, feeding on leaves, *b*, Social, feeding on leaves; *c*, Living in the galls of plants. (*Proc. B. S. N. H.*, 1861, p. 157.) We may now, from the facts first ascertained by myself, sub-divide group *c* as follows:—*c*, Gall-makers, living in galls made by themselves; *d*, Inquilines or guest-flies, living in galls made by other species of *Nematus* or by *Cecidomyia*. As will be hereinafter shown, there are also gall-making *Euura* and inquilineous *Euura*. In *Cynipidæ* there are tolerably well-marked structural characters, which, as a general though not perhaps as a universal rule, separate the Gall-makers from the Inquilines; (*Proc. &c.* II, pp. 477—8;) but I can detect none such either in the Tenthredinidous genera *Nematus* and *Euura* or in the Cecidomyidous sub-genera *Cecidomyia*, *Diplosis* and *Lasioptera*, all five of which contain some species that are gall-makers and some that are guest-flies. It does not follow, however, that a thing does not exist, because at present it has not been discovered. Observe that no Tenthredinidous genus, with the single exception of *Pristophora* (*P. sycophanta*, n. sp.)—a genus which is little more than a subgeneric form of *Nematus*—and no Cecidomyidous sub-genus is ever inquilineous, unless it also contains species that are true gall-makers. Now, if species were primordially created

with their present specific characters and specific habits, and if consequently the Inquilines were never aboriginally Gall-makers, it seems difficult to understand why there should not, for example, be inquilinous *Tenthredo*, *Selandria*, *Dolerus*, *Emphytus*, *Cimbex*, *Lyda*, *Cephus*, *Hylotoma*, &c., &c., as well as inquilinous *Nematus* and inquilinous *Euura*. Or, in Mr. Wallace's caustic language, must we simply "register the facts and wonder," (*Trans. Linn. Soc.* xxv, p. 31,) without attempting to explain or account for them? The advocates of the Creative Theory, have, indeed, a very short and easy method of treatment in such cases as these.—"I am right and you are wrong. Whenever a fact turns up that is apparently inconsistent with my hypothesis, I am not bound to explain it, *because I am in the right*. But whenever a fact turns up that is apparently inconsistent with your hypothesis, you must explain it thoroughly and satisfactorily, under pain of being nonsuited in the Court of Science, *because you are in the wrong*."

V. As a general rule, *Tenthredinidæ* are variable in their coloration, many species most astonishingly so. I may quote as notable examples *Acordulecera dorsalis* as described by Say, and *Nematus s. pomum*, n. sp., as described by myself. On the other hand the allied family *Ichneumonidæ* are generally very constant in their coloration. I have been in the habit here for many years of breeding and preserving large numbers of various species, and I am confident that this will hold good as a general rule, though of course there are certain exceptions. Now, assuming these facts to be as stated—and they are only a special example of what I have called elsewhere the Law of Equable Variability (*Proc. &c.* II, p. 213 and compare III, p. 424, note)—how can we satisfactorily account for them, on the hypothesis of each *Tenthredinidous* and *Ichneumonidous* species having been separately created, and not derived from some primordially pre-existing species?

VI. There are often very remarkable sexual differences in the coloration both of *Tenthredinidæ* and of *Ichneumonidæ*. As a general rule, when such differences exist in *Tenthredinidæ*, the ♂ body is much darker-colored than that of ♀. For example, when there are pale eye-orbits in both sexes they are uniformly narrower in the ♂ than in the ♀; again, the ♂ thorax or the ♂ abdomen, or both, will often be black or mostly black, and the ♀ thorax or ♀ abdomen, or both, red, yellow or greenish, or mostly red, yellow or greenish. Contrariwise, the antennæ, when sexual differences exist in their coloration, are generally paler in ♂ than in ♀, being often, especially on the inferior surface,

red or yellow or greenish in ♂, and black or brown-black, or nearly so, except at the extreme tip, in ♀.\* On the other hand, in the allied family *Ichneumonidae*, when sexual distinctions prevail as to the coloration, the ♂ body is almost universally lighter-colored, instead of darker-colored, than that of ♀. For example, it is perpetually the case that the face of the ♂ is white or yellow, and that of the ♀ black, with only the orbits white or yellow; or that the ♂ has long, broad orbits and the ♀ short, narrow ones or none at all. There are certain species, too, where the ♂ scutellum is white or yellow, and that of ♀ is but slightly or not at all marked with white or yellow. There are also very numerous species, where the ♂ pectus is white and the ♀ pectus red, or the ♂ pectus and pleura red and only the pectus ♀ red, or the ♂ pectus red and the ♀ pectus black. In many *Cryptus*, again, as in the European *C. sponsor*, the hind tarsi ♂ are mostly pure white and those of ♀ dusky. And almost always, when, as often happens, each successive set of coxæ and trochanters ♂ ♀ is less white or less yellow than the preceding set, (the ground-color of the legs being rufous or black,) the coxæ and trochanters will be more extensively white or yellow, and of a paler hue, in ♂ than in ♀. With regard to the an-

\* I may quote as conspicuous examples of these general rules, besides several undescribed species, *Zaræa inflata*, Norton, (♂ undescribed); *Acordulecera dorsalis* Say, (which is erroneously described by Say as varying equally in both sexes, whereas out of 62 specimens examined by myself the ♂ is always almost entirely black, and the ♀ varies from almost entirely black—4 ♀ out of 22 ♀—to almost entirely yellow); *Hylotoma scutellata* Say, (♂ undescribed); *H. coccinea*? Fabr., (♂ undescribed); *H. calcanea* Say, (♂ undescribed); *H. dulciaria* Say, (♂ undescribed); *Atomacera debilis* ♂, Say=*Atomacera ruficollis* ♀, Norton; *Tenthred. (Taronus) dubitata* Norton; *Macrophya bicincta* Norton; *Emphytus aperitus* Norton; *Lophyrus abietis* Harris; *Nematus ventricosus* Klug. (= *Selandria ribis* Winchell); and all the *Nematus* and *Euura* hereinafter described ♂ ♀; all from my own collection. Also from descriptions, where one or both sexes are absent in my collection, *Tenthredo (Strongylogaster) mellosa* Norton; *Tenthred. (Strong.) abdominalis* Nort.; *Tenthred. semilutea* Nort.; *Macrophya intermedia* Nort.; *Macr. albomaculata* Nort.; *Macr. pluricincta* Nort.; and *Macr. (Allantus) cestus* Say. The only conspicuous exceptions to these rules that are known to me are *Tenthred. (Allantus) verticalis* Say, in which species the ♂ abdomen is rather less marked with black than that of ♀, and *Cimbex americana* Leach, if this last be, as Mr. Norton supposes, (*Proc. &c.* I, p. 201,) identical with *C. LaPortei* St. Farg., which latter has the ♂ abdomen mostly red. I rather believe, however, that there are two distinct Phytophagic species here, one feeding on the elm and maturing in June, and another feeding on the willow and maturing late in September, the larvæ otherwise undistinguishable. Unfortunately, however, my specimens of both these two forms all died in the larva state in their cocoons, so that I throw out the above merely as a conjecture.

tennæ a double law seems to prevail here; for on the one hand there are several *Ichneumon* and *Cryptus*, where the flagellum ♂ is black immaculate and the flagellum ♀ is broadly uni-annulate with white or yellow; and on the other hand it is very generally the case, that the ♂ scape is white or yellow beneath, and the ♀ scape black immaculate.\*

In one apparently trivial sexual character that is not colorational but structural, the two families, *Tenthredinidæ* and *Ichneumonidæ*, agree universally, so far as I have observed, thus indicating their common origin from a very remote source; and as I do not know that it has been hitherto published, it may as well be stated here. Not only are the ♂ antennæ very generally longer than those of ♀—which is common almost every where in Insects—but they are universally much more compressed or vertically dilated in proportion to their length. So that antennal joint 3, for example, though of the same proportional length with regard to the other antennal joints in both sexes, and therefore absolutely longer in a ♂ than in a ♀ of the same size belonging to the same species, will be perhaps only twice as long as wide in ♂, while in ♀, from the compression or dilatation being proportionally so much less, it will be three or four times as long as wide.—I leave the believers in the Creative Theory to account for all these facts as they best can, or, if they prefer it, to repose calmly and blandly in the bosom of the Shandean Philosophy, viz: that it has pleased God to make everything thus and so, and that is enough for us.

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\* There are so many of our N. A. *Ichneumonidæ* undescribed, or described in one sex only, or ♂ ♀ described as distinct species, or described without stating the sex, that I can only give the few following examples of the above rules; but I am sure, from the many hundred species examined by me, most of them undescribed, that these rules are very generally as stated. *Pimpla pedalis* Cresson, (♂ only described); *Pimpla* [*Cryptus*] *conquisitor* Say (= *plurivinctus* Say); *Pimpla* [*Ichneumon*] *inquisitor*? Say, (♀ only described); *Ceratosoma apicalis* Cresson; *Cer. fasciata* Cresson; *Labena* [*Cryptus*] *grallator* Say and Cresson, (= *Mesochorus fuscipennis* Brullé); *Ichneumon morulus* Say, (♂ undescribed by Say, and — *Trogus flavitarsis* Cresson); *Ichn. otiosus* Say, (♀ only described); *Ichn. comes* Cresson, (♂ only described); *Ichn. grandis* Brullé, (♂ = *ambiguus* Cresson, ♀ = *regnatric* Cresson); *Ichn. rufiventris* Brullé; *Cryptus crassicornis* ♂ Cresson, (♀ = *robustus* Cresson); *Cryptus sponsor* (England); and *Mesostenus thoracicus* Cresson. The above all from my own collection. Also from descriptions, where one or both sexes are wanting in my collection, *Ichneumon comptus* Say; *Ichn. navus* Say; *Ichn. montanus* Cresson; *Cryptus extrematis* (—*mus*?) Cresson; *Hemiteles incertus* Cresson. (Cuba); *Mesostenus semialbus* Cresson, (Cuba); *Eretastes scutellaris* Cresson; *Anomalus*? *recurvus* Say; *Peltastes pollinctorius* Say; and *Arotes* [*Acænitus*] *decorus* Say.

VII. In common with preceding authors, I have described the veins in the Tenthredinidous wing as black, brown-black, &c., without taking any notice of the white "bullæ," which exist upon the veins throughout this family as I have shown them to exist throughout *Ichneumonidæ*.\* As is also the case in *Ichneumonidæ*, we find here in each genus peculiar modifications of the typical system of bullæ. For example, in *Hylotoma* the 1st submarginal cross-vein has one bulla much behind the middle; the 2nd submarginal cross-vein has two bullæ, either confluent (*H. scutellata* Say) or separated by a more or less considerable space; (*H. calcanea* Say, *H. dulciaria* Say, *H. coccinea* ? Fabr. and *H. McLeayi* Leach;) the 3rd submarginal cross-vein has two bullæ, placed one of them well forwards and the other well backwards, and separated by a wide space; and the 1st recurrent vein has one bulla placed at its extreme anterior end, and so as to extend on to and beyond the vein in front of it, besides the two universal bullæ, which I have lettered *F* and *G* in *Ichneumon*—making in all eight bullæ. Contrary to the general rule, there are in this genus absolutely no bullæ whatever on the 2nd recurrent vein. The genus *Tenthredo*, (including as sub-genera, in accordance with Hartig's opinion, *Strongylogaster*, *Taxonus*, *Allantus*, *Macrophya*, *Pachyprotasis* and *Selandria*) has the same eight bullæ as *Hylotoma*, except that the bulla on the 1st submarginal cross-vein (*N*, see below, fig. 1) is placed in the middle, instead of much behind the middle, and except also that the two bullæ, located respectively on the 2nd and 3rd submarginal cross-veins, are always widely confluent so as to cover nearly the whole vein; and in addition it possesses a bulla a little behind the middle of the marginal cross-vein (*M*), and two others, which are quite or nearly confluent, a little before the middle of the 2nd recurrent vein, corresponding to those which I have lettered *C* and *D* in *Ichneumon*—making in all eleven bullæ. In the genus *Emphytus*, on the other hand, where the 1st submarginal cross-vein is generically absent, the bulla on that vein is necessarily absent; and as the bullar system is otherwise the same as in *Tenthredo*, this genus has consequently ten bullæ. Finally, in the genus *Dolerus* (including *Dosytheus*), as the 2nd submarginal cross-vein is generically absent; the two bullæ found there in *Tenthredo* are necessarily absent; and as the bullar system is otherwise the

\* *Proc. etc.* V, pp. 209—215. Since that Paper was written, I have examined numerous European species belonging to many different genera of *Ichneumonidæ*, and ascertained that the bullæ follow precisely the same laws in exotic as in indigenous species.

same as in *Tenthredo*, except that *B* and *B'* are less obviously confluent, there are consequently *nine* bullæ. Thus it will be seen that the number of bullæ in this family differs in different genera from *eleven* to *eight*. In *Ichneumonidæ* it differs in different genera from *seven* to *four*, calling the spots *F* and *G* bullæ, as they evidently are homologous with *A—E*.

As is also the case in *Ichneumonidæ*, the bullæ are most distinctly seen in those species which have blackish wings; yet they are perceptible in certain lights in all species, even in those which have perfectly hyaline wings. But in certain genera and subgenera, e. g. *Hylotoma*, *Tenthredo* (*taxonus*), *Tenthredo* (*selandria*), *Dolerus* (= *Dosytheus*) and *Emphytus*, but not in *Cimbex* nor *Tenthredo* (*pachyprotasis*), there exist in species with blackish wings, in addition to the white bullæ, white streaks running in a fixed and definite pattern, from one bulla to another, and always located in certain slender folds between the main veins, which folds are found equally in such genera and subgenera as do not possess these streaks, and also in *Ichneumonidæ*, &c.

The annexed FIGURE 1 shows the whole system of bullæ and bullar streaks—magnified about six diameters—as it is exhibited in the front wing of *Tenthredo* in *Taxonus tacitus* Norton or *Selandria fumipennis* Norton.

Figure 1. Front wing of *Tenthredo*.

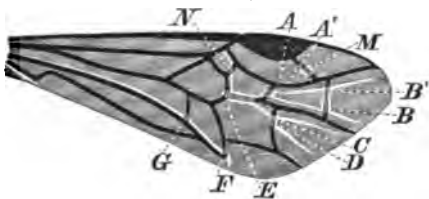
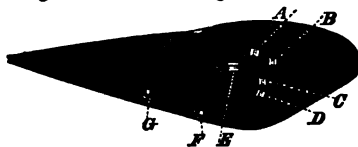


FIGURE 2, representing the front wing of *Ichneumon*, is repeated here from *Proc. etc.* V, p. 209, the homologous bullæ being lettered alike in both, so that the eye may catch at a glance the homologies of

the two systems. Moreover, not only is there a definite system of bullæ in the hind wing, as well as in the front wing, of *Tenthredinidæ*, just as I have stated to be the case

Figure 2. Front wing of *Ichneumon*.



in *Ichneumonidæ*, (*Proc. &c.* V, p. 213,) but in those species which possess bullar streaks in the front wing, there is a corresponding system of bullar streaks in the hind wing also, passing through the bullæ and and bifurcating as in the front wing. But to dwell in detail on all these points would be tedious.

From the above facts it follows, I think, conclusively, that these colorational streaks exist *typically* throughout the whole family of the Sawflies, but that in certain genera and subgenera they are broken up into a series of spots which we call "bullæ," located on the veins and that part of the membrane of the wings which immediately adjoins the veins. Similarly the *typical* black vittæ on the Chrysomelidous elytra are broken up in *Cerotoma caminea* Fabr., *Diabrotica 12-punctata* Fabr., *Chrysomela scripta* Fabr., and *Chr. interrupta* Fabr., into several series of short, black, longitudinal lines or spots; and in one and the same species—*Blepharida rhois* Forster—some varieties occur with three uninterrupted vittæ upon each elytrum, while ordinarily these vittæ are broken up into a very variable number of minute dots, and are sometimes almost entirely obsolete. It further seems to follow, that the system of bullæ in *Ichneumonidæ* has been derived from that of *Tenthredinidæ*, by omitting the bullar streaks, even in the darkest-winged species, (except the one passing through *F* and *G*, which in many genera, i. e. *Trogus*, is pretty distinct, and except also a vestige of the submarginal streak in certain species, which I have called a "semi-bulla,")\* and by suppressing a few of the bullæ themselves. For example, since both the marginal cross-vein and the 1st submarginal cross-vein are obsolete throughout *Ichneumonidæ*—just as the former is obsolete in the Tenthredinidous genera *Nematus*, *Euura*, &c., and the latter in the Tenthredinidous genus *Emphytus*—the Tenthredinidous bullæ *M* and *N*, which are located on those two cross-veins, are also necessarily obsolete in that family. Again, *A'* is never met with in *Ichneumonidæ*, although in *Pimpla* and *Ephialtes* both *B* and *B'* are found, which I had wrongly supposed to be attributable to the transference of *A* from one cross-vein to another. (*Proc. etc.*, V, p. 211.)

We can now see, likewise, why the bullæ *C* and *D*, which are separated by a wide space in the genus *Ichneumon*, (Fig. 2,) are in the Ichneumonidous genus *Glypta* separated only by a dot and occasionally even confluent, and in the Ichneumonidous genus *Cryptus* are normally confluent. Manifestly it is because the typical white bullar streak bifurcates, in the two first genera, on the basal side of the 2nd recurrent vein a little before it reaches that vein, while in *Cryptus*, as in *Tenthredo*, (Fig. 1, *C D*,) it bifurcates on the vein itself.

Although the locus of the bullæ and of the bullar streaks is always, as I have already stated, in certain slender folds of the wing, yet it is evident that they are not caused mechanically by those folds, as a piece of

\* See *Proc. etc.* V. p. 212.



stiffly-gummed black buckram assumes a white streak in the place where it has been frequently folded. For, 1st, although there is the same kind of folds in the Ichneumonidous as in the Tenthredinidous wing, yet there are never any complete bullar streaks in that family, except the one passing through *F* and *G*; 2nd, as Jurine has remarked, there are very many Hymenoptera that have no bullæ at all, to say nothing of bullar streaks, though they have the same kind of folds to their wings as *Tenthredinidæ*; 3rd, even in *Tenthredinidæ* there are certain folds in the wing which are not generally accompanied by a bullar streak, even in those species which have the normal bullar streaks fully developed; e. g. a fold in the 1st discoidal cell, which bears indeed a bullar streak in *Dolerus*, but not in any other Tenthredinous genus known to me, and the fold passing through the bulla *M* which never bears any bullar streak in any genus known to me; 4th, in *Eumenidæ* and *Vespidæ*, where the front wing of each individual living wasp is doubled up upon itself and undoubled perhaps a thousand times a day, we generally find no bullar streak in the *locus* where the doubling takes place; and although this fold passes through the bulla *G*, yet it passes through the vein on which *F* is placed, much higher up than *F*, and without causing there the least appearance of any bulla, even in certain dark-winged *Polistes* (*fuscatus*, Fabr. = *pallipes*, St. Farg., *annularis* Linn., and *rubiginosus* St. Farg.,) which possess a pale streak in the place where the folding takes place, and also a regular system of bullæ and bullar streaks.—Westwood, by the way, has inadvertently asserted “that we look in vain throughout the whole Order Hymenoptera, for any other instance” of the wings being doubled upon themselves, as they are well known to be in *Diplopteryga*. (*Introd.* II, p. 238.) They are doubled upon themselves precisely in the same manner in the Chalcidian genus *Leucospis*, and he had himself previously adverted to the fact. (*Ibid.* p. 164.) And in *Leucospis* (*affinis* Say, 4 specimens,) we do meet with a pale streak, in the *locus* where the folding takes place, though from the defective neurulation of the wing there is no visible bullar system.

It does not follow, therefore, because the *locus* of the bullæ and of the bullar streaks is in certain folds of the Tenthredinidous wing, that consequently the folds cause the streaks and the bullæ. Because in the typical Tenthredinide there is a pale vitta, the *locus* of which is immediately under the humeral suture, and because in the typical Ichneumonide there is, in addition, another pale vitta, the *locus* of which is immediately above the humeral suture, it by no means follows that

the humeral suture causes these vittæ. Again, because in the typical *Gomphus* (Pseudoneuroptera) there is a pale vitta, the *locus* of which is on the dorsal carina of what is called the dorsum of the thorax, it does not at all follow that the dorsal carina causes this vitta. Lastly, because in the front wing of *Noctuidæ* the *locus* of the "orbicular spot" is in the wing-cell above the main stem of the median vein, it would be poor logic to infer that that wing-cell throughout this Lepidopterous family causes the spot.

It might, as I formerly suggested, (*Proc. etc.* V, p. 213.) be assumed, that the paleness of the bullæ and of the bullar streaks is caused by a mere structural thinning out of the wing at these particular points. But an attentive examination of many hundred wings under a high power has satisfied me, so far as one can be satisfied without actually measuring and weighing, that the wing-vein is as thick at the point where the bulla occurs as elsewhere, and that consequently this phenomenon is colorational and not structural, except so far as all color may be caused by difference in the microscopic texture of the surface of the parts.

"When I discovered these bullæ," says Jurine, the first author who gave any account of them in print, though he entirely overlooked the bullæ *F* and *G*, "I presumed that they were apertures through which the air contained in the trachææ [wing-veins] was forced between the double membrane composing the general surface of the wing. But upon examining them with more attention, and upon reflecting that a great number of Hymenoptera were deprived of them, I abandoned that idea, and considered them as a dilatation of the corneous substance of the tubes, caused by the folds of the wing; (*déterminet par les plis de l'aile*;) and in fact it is always in the direction of these folds that the bullæ are found."\*

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\* *Nouvelle Méthode*, &c., I, *Introd.* p. 19. I am indebted to Mr. Cresson for calling my attention to this passage in Jurine. The genera especially referred to by this writer, as having an obvious system of bullæ, are *Nomada* and *Andrena*. The bullæ are tolerably plain also in *Cerceris*, *Philanthus*, *Astata*, *Sphex*, *Priononyx*, *Zethus*, *Augochlora*, *Epeolus* and *Macrocera*, and in many other Aculeate genera there are more or less plain vestiges of them. It is singular that Jurine in his text states that the number of bullæ in Hymenoptera varies from one to seven, (exclusive of course of *F* and *G* which he had entirely overlooked,) while in the figure which he gives he correctly represents the bullæ on the sub-marginal cross-veins and recurrent veins of *Andrena* and *Nomada* as eight in number. (Plate V, case 15.) He is incorrect in asserting that the continuity of the exterior tube of the vein is interrupted at the point where the bulla occurs. The transverse striations on the exterior of the vein may be distinctly traced under a high power throughout the bulla.

It has been shown, I think, that the bullæ cannot be caused by the folds of the wing, as Jurine imagined, in any other sense than that in which the teeth of a Mammal may be said to be caused by the gums. Neither can we accept the other hypothesis broached by this author, namely, that the bullæ are connected with the respiratory system, because the wing-veins are now generally supposed to be, not tracheæ or air-conducting tubes, as he imagined, but true veins or blood-conducting tubes. But may it not be possible that the bullæ and the bullar streaks are connected with the circulatory system? Until microscopists are agreed on first principles, it is difficult to answer this question satisfactorily. On the one hand, Bowerbank and others, according to Westwood, have proved "the circulation of a cold, transparent, and nearly colorless fluid, not only in the larvæ of *Ephemera*, &c., but also in the veins of the wings of the perfect *Hemerobius*." (*Introd.* I, pp. 11 and 15.) On the other hand, according to our distinguished American microscopist, Prof. H. J. Clark, the blood, as seems to be inferred from his language, circulates in the wings of insects, not through what are usually called the veins, but through channels which have no determinate walls. "A careful examination," says this last author, "of some of the more transparent insects, such as the May-fly, (*Ephemera*,) Gall-fly, (*Cynips*,) Plant-louse, (*Aphis*,) Lace-winged Fly, (*Chrysopa*,) Dragon-fly, (*Æschna*, *Agriion*, *Libellula*,) and the grub or worm of many more, has convinced me that, notwithstanding the apparent lack of walls to the channels of circulation, the course of the blood is none the less definite; always passing in one set of channels going from the heart, and returning toward it in another set. This is particularly noticeable in the head, legs and wings." (*Mind in Nature*, p. 224.) There are three facts, however, which induce me to think, that the bullar streaks cannot perform the same function as the veins in Vertebrata, i. e. reconducting to the heart the blood distributed by the arteries, on the assumption that the wing-veins act as arteries, or *vice versa*. 1st. As may be seen in Fig. 1, they cross the wing veins in all directions. 2nd. As is also shown in Fig. 1, and as any one may easily satisfy himself to be really the case, by inspecting the natural wing, instead of the branching bullar streaks thickening as they unite with each other and approach the heart, they positively become slenderer, and sometimes even become subobsolete, as they approach either the costa or the base of the wing. 3rd. In the genus *Dolerus* (= *Dosythicus*) in 27 specimens of 8 species that I have examined, all of them with distinct bullar streaks, (including *sericeus* Say,

*unicolor*? Beauv., *collaris* Say, *arvensis* Say, *bicolor* Beauv., *similis* Nort., and two others,) the anterior branch of the submarginal bullar streak, instead of uniting with the posterior branch, as in Fig. 1, *A A'*, fades out suddenly in the blackish or subhyaline membrane, which replaces in this genus the 2nd submarginal cross-vein *A A'*, so as to form no connection whatever with the other branch; though in a few specimens there is seen in certain lights an indistinct fold adumbrating the obsolete cross-vein, which fold, however, is not colored white like the streaks. Surely, if this anterior branch were a true vein or artery, it would form such a connection. What is very remarkable, though *Dosytheus apricus* Nort. (= *D. aprilis* Nort.) has wings no more hyaline than those of *similis* Nort. and *sericeus* Say, which exhibit distinct bullar streaks, in all my eight specimens of this species there are no bullar streaks whatever perceptible, though the folds in the wing are as distinct as usual.

Without venturing the assertion, that the bullæ and the bullar streaks have nothing whatever to do with the circulatory system in the wings, it becomes, I think, sufficiently evident that they cannot perform the function of the veins in Vertebrata, the so-called wing-veins acting as arteries, or *vice versa*. More than this, in the present state of our knowledge upon this subject, it would be unsafe to assert. But even assuming that they form some of the definite channels for the circulatory system, spoken of by Prof. Clark as being without any apparent walls, yet this is quite a different fact from their being colorationally distinguished from the rest of the wing. If the bullar streaks form such channels, it is reasonable to infer that similar channels exist in all Hymenopterous genera, which have visible bullæ but no bullar streaks, and again, in all Hymenopterous genera which have neither visible bullæ nor visible bullar streaks. Their supposed function as blood-conducting channels without determinate walls, is a structural fact; their being sometimes colored in a peculiar manner is a colorational fact; and the two facts, as is abundantly shown by the phenomena exhibited in the Hymenopterous wing, have no necessary connection with each other. Hence, whatever views we may adopt as to the the circulatory system in the Hymenopterous wing, the peculiar coloration of both the bullæ and the bullar streaks, in such species of certain genera and subgenera as have blackish wings, (Fig. 1,) and even in a few species (*Dolerus sericeus* Say and *D. similis* Norton) which have wings that are almost hyaline, the peculiar coloration of the bullæ alone in other genera, (Fig. 2,) and the total absence of any such

coloration in another large group of genera, will always remain as a curious example of what I have called Unity of Coloration. As in other such cases, there exists here a definite Colorational Pattern, distinctly traceable through large groups of species, while in other large groups this Pattern is more or less subobsolete, and in still other groups the Pattern is entirely obsolete.

The Tenthredinidous Willow-galls that are known to me may be thus tabulated, so as to form the complement of the Synopsis of Cecidomyidous Willow-galls given in the former part of this Paper. (*Proc. &c.* III, pp. 575—6.)

SYNOPSIS OF THE TENTHREDINIDOUS GALLS OF THE GENUS *SALIX*  
(WILLOW.)

- A. Gall always monothalamous, and evidently a deformation of a bud.
- III. Bud simply enlarged; its leaves obliterated. } 16, *S. gemma*, n. sp. on *S. humilis*.
- B. Gall a deformation, and swelling of the bud itself.
4. Gall monothalamous, spongy, growing from the side of the twig. } 17, *S. ovum*, n. sp. on *S. cordata*.  
18, *S. ovalum*, n. sp. on *S. humilis*.
5. Gall a mere enlargement of the twig, polythalamous, pithy inside, with its cells all internal. } 19, *S. nodus*, n. sp. on *S. longifolia*.
- C. Gall growing out of the leaf, the shape and structure of the leaf still plainly perceptible, monothalamous.
- † Quite large, and never, except very rarely, confluent one with another.
3. Spherical or short-oval, sessile. } 20, *S. pomum*, n. sp. on *S. cordata* and *S. discolor*.
4. Semicircular in outline, sessile. } 21, *S. desmodioides*, n. sp. on *S. humilis*.
5. Spherical, with a very short peduncle. } 21bis. *S. pisum*, n. sp. on *S. discolor*.
- D. Not represented.

Genus *EUURA*.

This genus differs from *Nematus* in having only 3, not 4, submarginal cells, the one which is 3rd in *Nematus* being obsolete. Specimens of *Nematus* are occasionally found with one of the two front wings like those of *Euura*; e. g. 2 out of 10 *N. s. desmodioides*, n. sp., 1 out of 4 *N. s. pisum*, n. sp., and 4 out of 72 *N. s. pomum*, n. sp. In a bred ♂ of *Nematus ventricosus* Klug, (= *Selandria ribis* Winchell,) both wings have only 3 submarginal cells, so that if captured at large the specimen would naturally be referred to *Euura*. In *Tenthredo*, *Allantus*, *Selandria*, &c., I notice many similar anomalies, proving

that the genera *Emphytus* and *Dolerus* cannot be separated from the former by any impassable barrier. Systematists are by no means pleased with such cases as these, because they undermine the foundations of their theories; and such writers as are scientifically dishonest, often wilfully ignore and conceal them. But they are especially interesting to the philosophic naturalist, as showing how one genus gradually passes into another, and how genera have no real ever-permanent existence in nature, but are mere contingent eventualities, dependent upon the circumstance of whether a certain number of intermediate specific forms have perished or not from off the face of the earth, or have escaped or not the researches of collectors. "The Coleopterous genus *Brachys*," says LeConte, "forms several distinct groups, which I should consider as genera, but that Lacordaire states that they merge imperceptibly together." (*Trans. Ann. Phil. Soc.* XI, p. 251.) On similar principles the very extensive old Geodephagous genera *Agonum*, *Platynus* and *Anchomenus*, and the almost equally extensive old Hydradephagous genera *Hydroporus* and *Hygrotus*, have been amalgamated; while, on the other hand, small genera, containing only a few species, are every day being cut up into new genera, each containing only one or two species, thus making the rich richer and the poor poorer still. In Lepidoptera, according to the Rev. Mr. Green, there is a biennial revolution in England in generic nomenclature; and in Hemiptera Amyot and Serville expressly avow it as their plan, whenever they can establish any difference whatever between two species sufficient for a generic subdivision, to found new genera wherein to place each differing species. (*Hemipt. Introd.* pp, vi—vii.) Where are now the old Linnæan genera? Scarcely a single one remains in the old Linnæan acceptation—all have been cut up into small fragments, and are being daily split up still finer, then, perhaps, re-united, and then once more split up into minute fragments; while the Linnæan species—with a few exceptions, due to misinformation or error on the part of the great founder of Natural History—stand like a rock, and will stand for indefinite ages. And yet we are gravely told, that genera have as real an existence in nature as species!

The genus *Euura* (anglice "well-tailed") takes its name from the unusual length of the anal styles or "cerci;" (*Westw. Introd.* II, p. 93, note;) but this character occurs only in the ♀, the ♂♂ of both *Euura* and *Nematus* having very minute cerci. Why unusual length of ♀ cerci should be invariably, so far as I am aware, correlated in

this genus with the obsolescence of the 3rd submarginal cell ♂ ♀, is as inexplicable a thing as why blue eyes in the domestic cat should be invariably correlated with deafness. (Darwin, *Orig. Spec.* p. 18.) Judging from what Brullé says, (*Hymen*, p. 666,) *Pteronus* Jurine must be synonymous with *Euura* Newman; although Westwood (*Synops.* p. 54,) gives *Pteronus* Jur. as the synonym of *Lophyrus* Latr., which last has multiarticulate, not 9-jointed antennæ, and also of *Cladius* Leach, which has ♂ antennæ pectinated. But be this as it may, it is always better to retain a name that is in general use, than to rake up an old name that was used by our grandfathers. "The naturalist," says Dr. P. P. Carpenter, "is not necessarily an archæologist."

Genus **EUURA**.—Gall-makers.

**No. 16. *Gali Salicis gemma*, n. sp.**—On *Salix humilis*. The lateral bud of a twig, enlarged so as to be twice or thrice as long wide and thick as the natural bud before it begins to expand in the spring, its external surface otherwise entirely unchanged both in texture and color. Internally, instead of the normal downy embryo leaves, it contains early in the autumn a homogeneous, grass-green, fleshy matter, which is afterwards gradually consumed by the larva, leaving nothing at last but a mere shell, as thin as paper, and partly filled with excrement. Sometimes, from the egg failing to hatch out, this green fleshy matter remains unaltered till the spring. The gall is monothalamous, sometimes one only on a twig, sometimes two or three or more at irregular intervals, very rarely as many as 3 or 4 formed out of 3 or 4 consecutive buds. Common and not local. Described from 34 specimens. Length .17—.36 inch; breadth .10—.17 inch. Analogous to the Cecidomyidous gall *S. cornu* Walsh, but very different in its general appearance and in its internal structure.

**Larva.** The larva is 20-footed, and on Oct. 2 is .13—.19 inch long, of a greenish-white color, the head tinged with dusky, and with the usual fuscous eye-spots. Mouth dusky. At this date a few galls were already bored, and the other larvæ not long after this bored out, and retired an inch or so underground, where they spin a thin, whitish, silken cocoon, to which many particles of earth adhere externally. Two specimens.

**Pupa** unknown.

**Imago. *Euura s. gemma*, n. sp.**—♀ Shining black. Head pale luteous; eyes, a square spot enclosing the ocelli, and separated by a moderately wide orbit from the eyes, and also the tips of the mandibles, all black. Clypeus emarginate in a circular arc of about 90°. Palpi fuscous at tip. Occiput clouded in the middle with black. Labrum rounded at tip. Antennæ black, except their extreme tips below which are dull rufous, three-fifths as long as the body, joints 3—5 subequal, 4 slightly the longest, 5—9 very slowly shorter and shorter. Thorax with the tegulæ and the upper and hind edge of the collare, and also the cenchri, all pale luteous. Abdomen with the basal membrane whitish; ventral joints 5 and 6 luteous, but the lateral plates black, so that the tip of the venter seems at first sight black. Sheaths of the ovipositor black. Legs pale luteous; tarsal tips, especially in the hind legs, obfuscated. Wings hyaline; veins black;

stigma fuscous, dull luteous basally and behind. Length ♀ .12 inch; front wing ♀ .13 inch.

♂ Differs from ♀ only as follows:—1st. The spot enclosing the ocelli is larger and separated from the eyes only by a very narrow orbit; and the occiput is distinctly black, except the orbits. 2nd. The flagellum is dull rufous above on the terminal  $\frac{1}{2}$  and entirely bright rufo-luteous below. 3rd. The antennæ are  $\frac{3}{4}$  (not 3-5ths) as long as the body. 4th. The entire tip of the venter is luteous, the lateral plates not concealing its tip in this sex. Length ♂ .12 inch, front wing ♂ .13 inch.

One ♂, one ♀. The ♂ came out May 5, the ♀ May 20. Differs from *Euura orbitalis* Nort. (the only described N. A. species) by the antennæ not having in both sexes alike "the apical half pale beneath," and by the venter not being black immaculate. That species is described as having "a pale luteous spot on the 1st segment of the abdomen," but this probably refers to the basal membrane. *Orbitalis* is said to have been taken on "the willow," the particular species not being mentioned.

No. 17. *Gall s. ovum*, n. sp.—On *Salix cordata*. An oval or roundish sessile monothalamous swelling, .30—.50 inch long, placed lengthways on the side of small twigs, green wherever it is smooth, but mostly covered with shallow longitudinal cracks and irregular rough scales which are pale opaque brown. Its internal substance fleshy in the summer like that of an apple, but with transverse internal fibres. When ripe in the autumn, filled with reddish-brown spongy matter, with close-set transverse internal fissures at right angles to the axis of the twig. On cutting down to the twig at any time, a longitudinal slit about .20 inch long becomes plainly visible. Particular twigs on badly infested bushes sometimes have one of these galls about on every half inch of their length, and not placed in a regular row, but indiscriminately on any side of the twig. Abundant but local. Described from very numerous specimens.

**Larva.** By August 30 many larvæ are already .10—.12 inch long, and are then imbedded in the slit at the base of the gall; but in many other galls the larvæ are apparently not yet hatched. At this date the larva is pale-yellowish, with a very pale fuscous head and the usual dark eye-spots. Tips of the mandibles blackish. When removed from the gall it uses its legs freely. On Oct. 2, many larvæ were still in the gall, and many remain there all winter, and finish their transformations without going underground. From other galls the larvæ had bored their way out, and no doubt gone underground, leaving their excrement behind them in the excavated gall. On Feb. 20, a larva (1 specimen) was .22 inch long, very pale dull greenish cinereous, the head darker, with a large, blackish, round spot on the face, and the usual eye-spots. Mandibles blackish. Legs long, but porrect backwards and apparently functionally impotent. Prolegs 14, tuberculiform and very short and flat. Most probably, however, this larva must have been that of some unknown inquilinous species. A similar larva, probably that of the inquilinous *Nem. hospes*, n. sp., was found repeatedly in the spring in the Cecidomyidous gall *S. strobiloides* C. S., from which gall I subsequently bred 1 ♂, 2 ♀ of *N. hospes*, and also a single ♂ of the inquilinous *Euura perturbans*, n. sp. A few galls, as late as March 6, were still solid and un-



bored, showing that in these the egg had failed to hatch out. My 15 imagos all transformed in the gall, the galls having been gathered in March. Described from 7 specimens.

**Pupa unknown.**

**Imago. *Euura s. ovum*, n. sp.—♀** Shining honey-yellow. *Head* with the eyes, a square spot enclosing the ocelli, but separated from the eyes by a pretty wide orbit, and also the tips of the mandibles, all black. Clypeus emarginate in a circular arc of about 90°. Labrum rounded at tip. Occiput more or less clouded with black on the disk. Antennæ dull rufous above, with their basal  $\frac{1}{2}$  black, honey-yellow below, with the scape black, and more or less of the basal  $\frac{1}{2}$  of the flagellum dusky, three-fifths as long as the body, joints 3—5 subequal, 4 slightly the longest, 5—8 very slowly shorter and shorter, 9 full as long as 8. *Thorax* with an oblong spot on the anterior lobe of the mesonotum, generally extending from the collare  $\frac{2}{3}$  of the way to the hind angle of the lobe, rarely covering almost its entire surface, the interior  $\frac{1}{2}$  of each lateral lobe and sometimes its entire surface, base and tip of the scutell and rarely its entire surface, anterior disk of the metanotum, and the edges of the basal plate that border on the basal membrane, or rarely the entire surface of the basal plate, all black. Cenchri whitish. A more or less distinct black cloud on the pectus, and another on the posterior disk of the pleura, the former occasionally obsolete. *Abdomen* with that part of the anterior edge of joint 1 that borders the whitish basal membrane, or rarely the basal  $\frac{1}{2}$  of joint 1, black. Ovipositor honey-yellow, its sheaths dusky. Cerci full as long as the last tarsal joint of the hind legs, honey-yellow, lightly tipped with dusky. *Legs* honey-yellow, the tarsal claws dusky. *Wings* hyaline; veins black; those on the costa, as well as the basal  $\frac{1}{2}$  of the stigma, whitish or yellowish; the rest of the stigma dusky. Length ♀ .17—.22 inch; front wing ♀ .18—.24 inch.

♂ Differs from the normal ♀ only as follows:—1st. The ground-color is greenish-white, not honey-yellow. 2nd. The black spot enclosing the ocelli is larger, and is separated from the eyes only by a narrow orbit and occasionally touches them for a small space. 3rd. The occiput, except the orbit, is distinctly black. 4th. In the antennæ the pale colors are more dominant, and verge more or less on greenish-white; and the antennæ are  $\frac{2}{3}$  (not  $\frac{3}{5}$ ths) as long as the body. 5th. The thorax is black, except the tegulae, the superior margin of the collare and the cenchri, which are all greenish-white. 6th. The abdomen is black above, greenish-white below, the lateral plates basally black, but terminally clouded with the pale color. Basal membrane white. 7th. The legs are greenish-white, sometimes, especially the hind legs, more or less honey-yellow. In the hind legs the base of the coxae, the extreme tips of the femora and the tarsi are more or less fuscous. 8th. The veins on the costa are scarcely whitish, and only the extreme base of the stigma is whitish. Length ♂ .10—.17 inch; front wing ♂ .11—.19 inch.

Ten ♂, five ♀, bred April 16—27. Absolutely undistinguishable by any reliable character from the inquiline *Euura perturbans* n. sp., u. v. Distinct at once from *E. s. gemma* and from *E. orbitalis* Nort., by the abdomen ♀ being honey-yellow above and below, and by the abdomen ♂ having its lateral plates partly pale, and the venter entirely pale.

No. 18. GALL *S. OVULUM*, n. sp.—On *S. humilis*. Undistinguishable both internally and externally from *S. ovum* n. sp. But for the fact that the larvæ differ in color, and that, of the five species of willow found near Rock Island, Ill., this type of gall occurs only on *S. humilis* and *S. cordata*—two willows which are, according to Mr. Bebb, very distinct—and never, as I have carefully observed, on *S. discolor*—which is on the same authority, very closely allied to *S. humilis*, the species on which *S. ovulum* is found—I should not suppose *S. ovulum* to be a distinct (phytophagic) species from *S. ovum*. Possibly, indeed, it may not be so; and to determine doubts it is better to await the discovery of ♂ ♀ imago. Besides the three bushes of *S. discolor* mentioned above, (*Proc. III*, p. 589,) I have since discovered and examined closely several dozens. This gall was rare in 1864—5 and 1865—6, but common in 1863—4. Not local, but generally distributed. Described from 30 specimens.

LARVA. On August 30 I compared 6 larvæ, freshly taken from the gall *S. ovulum*, with 6 freshly taken from the gall *S. ovum*; and while the latter were all decidedly yellowish, the former were all decidedly pale greenish. In other respects they did not differ perceptibly, and both had free use of their legs.

PUPA and IMAGO unknown.

No. 19. GALL *S. nodus*, n. sp.—On *S. longifolia*. A mere gradual enlargement of a twig from  $\frac{1}{2}$  more than its normal diameter up to twice its normal diameter, almost always without any abnormal roughness on the external bark, and always not confined to one side only of the twig. General color that of the twig. When cut into, Aug. 28, the interior of each gall is found to be pithy, and to contain 1—3 larvæ in separate cells. Frequently, on a piece of a twig 6 inches long, 2, 3 or 4 of these galls are placed at irregular intervals. No appearance internally of any transverse plates or transverse fibres as in *S. ovum* and *S. ovulum*. Length .75—1.50 inch; diameter .10—.25 inch. Described from 31 affected twigs. Abundant but very local. Very like the Cecidomyioid gall *S. nodulus* on the same willow, (*Proc. &c. III*, p. 600,) but is much larger, is polythalamous instead of monothalamous, and occurs near Rock Island, Ill., in quite a different locality. Analogous willow-galls are made in Europe, not by a *Euura*, but by several small species of *Nematus*. (*Westw. Introd. II*, p. 105.)

Larva. Aug. 28, the larva is 20 footed, of a pale greenish white color, with the mouth dark and the usual dark eye-spots. Length about .15 inch. On April 2, a larva (1 specimen) cut out of a gall gathered in the preceding August, was whitish, with a testaceous head and the usual eye-spots. Hence it appears, that some larvæ, at all events, do not go underground to pass the winter, but undergo their transformations in the gall, and also that the larva does not pupize till the following spring.

Pupa unknown.

Imago. *Euura s. nodus*, n. sp.—♂ Differs from ♂ *Euura n. ovum* only as follows:—1st. The pale color is bright honey-yellow, not greenish-white, through-

out, i. e. both in antennæ, body and legs. 2nd. The black spot enclosing the ocelli is larger, and is confluent with the eye for its entire length, leaving no orbit between them. 3rd. The venter (dried) is honey yellow on the terminal 3 or 4 joints, and in the middle only of one or two more. Basal plates black, as in *E. s. gemma*. When recent the venter was noted as being "greenish" and the legs as "pale fulvous." 4th. The legs (dried) are honey-yellow immaculate, except the extreme tarsal tips. 5th. The basal  $\frac{1}{2}$  of the stigma is whitish, as in *E. s. ovum* ♀. Length ♂ .16—.17 inch; front wing ♂ .17—.18 inch.

Two ♂, ♀ unknown. One ♂ came out April 28, the other May 12. Differs from *E. s. gemma* ♂ and *E. orbitalis* ♂ Nort., by the spot on the vertex being confluent with the eye and by the yellowish ground-color; and from the latter also by the pale venter. The size is also larger than that of *E. s. gemma*; but *E. s. ovum* ♂ varies in size fully as much. Possibly the ♀ may differ more remarkably from the ♀ of those species.

Genus **EUURA**.—Inquilines or Guest-flies.

**EUURA PERTURBANS**, n. sp.—♀ Differs from the gall-making *E. s. ovum* ♀, only by the dorsum of the abdomen varying from honey-yellow, including the lateral plates, through obfuscated, to deep black with the lateral plates also black. The ♂ does not differ in any respect from *E. s. ovum* ♂. Probably if I had bred more *E. s. ovum* ♀, varieties would have occurred there also with the abdomen obfuscated or black above, just as such varieties occur in my *Nematus s. pomum* ♀, n. sp. There is a similar case of extreme range of colorational variation in *Acordulecera dorsalis* ♀ Say, which has been already referred to in a note. (Above, p. 239.) By way of testing the apparent identity of the two species, I sent a normal ♀ of *E. perturbans*, and a ♀ *E. s. ovum* to Mr. Norton, along with many ♂ ♀ varieties of *Nematus s. pomum*, each specimen numbered, but none of them named. And although, as I fully expected, from the great variability of the ♀, he made two species of *N. s. pomum* ♀, yet he pronounced *E. perturbans* ♀ and *E. s. ovum* ♀ to belong to the same species. I think, under the same circumstances, I should have done the same thing myself. Hence we may see how impossible it often is to define the specific characters of different *Nematus* and *Euura*, from the mere comparison of cabinet specimens of their imagos. I believe Mr. Norton has arrived independently at the same conclusion, judging from what he says to me.

Two ♂, five ♀. One ♂ bred April 7, from the Cecidomyioid gall *S. strobiloides*, O. S.; one ♂, two ♀, bred May 7—22, from the Cecidomyioid gall *S. batatas* Walsh; one ♀, bred May 16, from the Cecidomyioid gall *S. rhodoides* Walsh; all the above from galls of the

preceding year; and two ♀, bred many years ago, in the same season that the gall was produced, so far as I recollect, from an undescribed Cecidomyioidous bud-gall—*Vitis fusus* Walsh, MS.—composed of bunches of 6—50 fusiform galls growing on the stem of the wild grape-vine, *Vitis cordifolia*, each gall attached by a single point, and about  $\frac{1}{2}$  an inch long.

Genus **NEMATUS**.—Gall-makers.

No. 20. **Gall *S. pomum*, n. sp.**—On *S. cordata*, (and very rarely on *S. discolor*.) A smooth, fleshy, sessile, globular or slightly oval, monothalamous gall, resembling a miniature apple, .30—.55 inch in diameter, growing on one side of the midrib of a leaf, and extending to its edge or sometimes a little beyond it. The principal part of the gall generally projects from the under side of the leaf, and only about 1-6th of its volume from the upper side, although very rarely it is almost equally bisected by the plane of the leaf. Scarcely ever more than one gall on a leaf, and very rarely two of them more or less confluent, so as to seem like one kidney-shaped gall. External color greenish-yellow, generally with a rosy cheek like an apple, especially on the upper surface, and often with many dark little dots on its surface. Internal color whitish. The above is the appearance presented July 31 when the gall is fully matured, but as early as May 24 it has nearly attained its full size, and has the rosy cheek very conspicuous. Abundant but rather local. Described from very numerous specimens. As to the occasional occurrence of this gall on *S. discolor* see under No. 21 *bis*. An analogous gall is formed in Europe on the leaves of various kinds of willows by *Nematus gallicola* Westw.

**Larva.** May 24 the larva is only about .10 inch long. On June 11 it is white, .10—.13 inch long. On July 24 it is .15 inch long. On July 30—31 it is .15—.20 inch long, of a pale greenish-white color, the head pale brown, with the usual eye-spots blackish and distinct. Legs freely moveable; 12 abdominal prolegs on joints 5—10 and 2 anal prolegs on joint 12. On Sept. 9, I noticed in a jar containing several hundred of these galls, three larvæ crawling about which were .35—.40 inch long, of a pale cinereous color, with some pale dusky markings and the usual dusky eye-spots. Their legs were freely moveable. Most probably, judging from their size, these last appertained to the inquilinous *N. mendicus*, n. sp., one specimen of which I bred the following spring from the same lot of galls. Of the very large number of the gall-making *N. s. pomum* bred therefrom the same spring, almost all spun up inside their galls, and only a few between and among them, there being no earth in this jar under which they could have retired if they had been so minded.

**Pupa** unknown.

**Imago.** *Nematus s. pomum*, n. sp.—♀ Shining honey-yellow. Head with the eyes, a quadrate spot sometimes barely enclosing the ocelli, sometimes almost reaching the antennæ, but even then always separated from the eyes by a tolerably wide orbit, and also the tips of the mandibles, all black. Clypeus emarginate in a circular arc of about 90°. Labrum rounded at tip. Occiput always with a capillary black line located in the usual lateral stria, and slowly converging from each posterior ocellus to the disk, where it meets a transverse capillary black line, so as to enclose a trapezoidal space, which is rarely occupied by a black cloud. Antennæ  $\frac{1}{2}$  as long as the body, joints 3—5 subequal, 6—8 slowly shorter and shorter, 9 generally as long as 8, the scape black, the flagellum

brown-black, its terminal  $\frac{1}{2}$  beneath often tinged with rufous. *Thorax* always with an obscure subquadrate spot where the mesonotal grooves decussate, and a more definite elongate one on the anterior  $\frac{1}{2}$  of the anterior lobe, the two often confluent, the tip of the scutell sometimes, and always the entire metanotum including the basal plates, all black. Very rarely the entire mesonotum is black. Cenchri whitish. Pectus immaculate, except in one dark ♀ where it is slightly obfuscated. Dorsum of the *abdomen* sometimes with only the basal edge of joint 1, black, and all the sutures toward the base, dusky; usually with more or less of its basal  $\frac{1}{2}$  black; rarely with its whole or nearly with its whole surface blackish or black. Lateral plates honey-yellow, very rarely (1 ♀) basally black. Venter always immaculate. Ovipositor honey-yellow, its sheaths black. Basal membrane whitish. Legs honey-yellow, the four front legs with their coxæ and trochanters generally more or less whitish; tips of all six tarsi, especially the hind ones, lightly obfuscated, as are also sometimes the extreme tips of the hind tibiae. Wings hyaline; veins black, the costa honey-yellow; stigma basally honey-yellow, terminally fuscous. Third submarginal cell usually longer than wide, sometimes square, very rarely and only in a single wing 3 or 4 times wider than long or entirely obsolete. Length ♀ .12—.22 inch; front wing ♀ .14—.25 inch.

♂ Differs from normal ♀ only as follows:—1st. The quadrate spot on the vertex is larger, often confluent with the eyes either throughout its length or in a single point, and never separated from them but by a capillary orbit. 2nd. The occiput, except a very narrow orbit, is decidedly black. 3rd. The antennæ are  $\frac{3}{4}$  (not  $\frac{1}{2}$ ) as long as the body, almost invariably dull rufous above, except towards the base, and bright rufous or pale dull green beneath, except towards the base, very rarely (1 ♂) colored as in ♀. 4th. The entire thorax is black, except the tegulæ and an elongate-triangular line on the superior margin of the collare, which are honey-yellow, and the cenchri which are whitish. 5th. The dorsum of the abdomen is black, 2 or 3 of the terminal joints sometimes, and occasionally joint 1 or joints 1 and 5 also, lightly tipped with yellow, the lateral plates honey-yellow clouded with dusky, especially towards the base. Venter immaculate. 6th. The costa is scarcely pale, and only the extreme base of the stigma is whitish. Length ♂ .17—.20 inch; front wing ♂ .18—.20 inch.

Twenty-six ♂, forty-six ♀, bred April 16—25. A single ♀ bred many years ago, and according to the label from this gall, differs from all the other ♀ in the thorax being as black as in ♂. Distinct from *longicornis* Say, which is described by Say, without any reference whatever to sex, though Mr. Norton quotes him as describing the ♀ exclusively, (*Proc. B. S. N. H.* 1861, p. 158,) by neither sex ever having "two black spots beneath the wings," and by the antennæ being rather short than long. From *nigritus* ♂ Nort., *fulvipes* ♂ Nort., *pallicornis* ♀ Nort., *proximatus* ♀ Nort., *obscurus* ♀ Nort., *luteotergus* ♂ Nort., *erythrogaster* ♀ Nort., *Marylandicus* ♂ Nort., and *subalbatu* ♀ Nort., (which last seems to belong to the genus *Messa*,) distinct by the pale face ♂ ♀ and many other characters; and from *brunneus* ♀ Nort. by the body ♀ being always more or less marked with black. The other described N. A. species, so far as known to me, are entirely different.

No. 21. Gall *S. desmodioides*, n. sp.—On *S. humilis*. A smooth, flattish, fleshy, sessile, yellowish-green, monothalamous gall of a semicircular outline, the chord of the semicircle adjoining the midrib of a leaf; its general shape like the seed of a *Desmodium*, or like the so-called “quarter” of an orange, the thin inside edge of the “quarter” closely hugging the midrib of the leaf, and the robust outer surface not biangulated but rounded off. No rosy cheek. The volume of the gall is generally about equally divided between the upper and lower sides of the leaf, but sometimes the lower portion is rather the larger. Usually there is but a single gall on a single leaf, but occasionally there are two of them either on the same side or on opposite sides of the midrib. One leaf was noticed with as many as three of these galls upon it. Length .23—.50 inch; 131 specimens. The above is the appearance of the mature gall July 30; but on May 17 it is already nearly full-sized, and then many of them have a rosy cheek like the normal *S. pomum*. Abundant and not local. Distinct from *S. pomum* by its very different shape, and by its never having any rosy cheek when mature, and by the very distinct species of willow on which it occurs.

**Larva.** Three or four larvæ examined July 30 did not differ apparently from those of *N. s. pomum* examined on the same day. When the larva quits feeding on the gall, there remains nothing of it but a shell as thin as paper. All the imagoes bred by me pupized inside the gall, but there was no earth in the breeding vase for them to retire into, and April 2 I found several dead and dried up larvæ at the bottom.

**Pupa** unknown.

**Imago.** *Nematus s. desmodioides*, n. sp.—♀ Shining greenish-white. Head with the eyes, a quadrate spot enclosing the ocelli, and nearly reaching the antennæ, but always separated from the eyes by an orbit which is almost always pretty wide, and also the tips of the mandibles, all black. Clypeus emarginate in a circular arc of about 90°. Labrum rounded at tip. Occiput always with a more or less dark black cloud on its upper disk confluent with the ocellar quadrate spot, so as to conceal generally the capillary black lines so conspicuous in *N. s. pomum*. Antennæ  $\frac{1}{2}$  as long as the body, joints 3—5 subequal, 6—9 slowly shorter and shorter, 9 sometimes as long as 8, the scape black, the flagellum brown-black. Thorax, including the basal plates, black, with the tegulæ, a pair of obscure spots transversely arranged on the scutellum and sometimes contiguous, the entire collare, except generally a lateral black spot on its lower angle, and a large obscurely defined triangular spot of variable size on the upper part of the mesothoracic pleura, all greenish-white. Rarely (2 ♀ out of 8 ♀) the mesonotum is dull rufous, with a broad black vitta reaching from the collare to the scutellum and the extreme tip of the scutellum black, as in many *S. pomum* ♀. Cenchri whitish. Abdomen, except generally the extreme tip, black above, the lateral plates black towards the base of the abdomen, greenish-white towards its tip. Basal membrane whitish. Cerci usually greenish-white, rarely tipped with dusky. Ovipositor greenish-white; its sheaths black. Venter always immaculate, tinged more or less with honey-yellow. Legs greenish-white, the hind legs sometimes tinged with honey-yellow; tarsal tips, especially in the hind legs, and generally the extreme tips of the hind tibiae, obfuscated. Wings hyaline; veins black; costa and stigma pale dusky, the basal  $\frac{1}{2}$  of the stigma tinged with greenish-white. The 3rd submarginal cell varying from  $\frac{1}{2}$  longer than wide to a little shorter than wide. In one wing of one ♀ (and also of one ♂) it is entirely absent. Length ♀ .15—.19 inch; front wing ♀ .17—.20 inch.

♂ Differs from normal ♀ only as follows:—1st. The quadrate spot enclosing the ocelli is larger and confluent with the eyes or only separated by a capillary orbit. 2nd. The occiput is distinctly black, except a narrow orbit. 3rd. The antennæ are  $\frac{3}{4}$  (not  $\frac{1}{2}$ ) as long as the body. 4th. The thorax is black, except the tegulae, and a line on the superior margin of the collar which also extends downwards on its hind margin, all greenish-white. Cenchri whitish. 5th. The venter is greenish-white untinged with yellow, the lateral plates black, but terminally a little clouded with pale. 9th. The legs are not tinged with yellow. 7th. The stigma is uniformly pale dusky. Length ♂ .16 inch, front wing ♂ .17 inch.

Two ♂, eight ♀, bred April 2—15. Distinct from the average specimens of *S. pomum* by the greenish-white (not honey-yellow) ground-color ♂ ♀, by the brown-black flagellum of the antenna ♂, and the black thorax and abdominal dorsum ♀. Specimens however of *S. pomum* ♀ which are abnormally dark are scarcely distinguishable from specimens of *S. desmodioides* ♀ which are abnormally pale; so that, if captured at large, one could scarcely tell which species they belonged to. From certain described species it differs precisely as the preceding. I noticed the difference in the ground color of the two species April 16 in recent specimens when placed side by side.

No. 21bis. Gall *S. pisum*, n. sp.—On *S. discolor*. A subspherical, pea-like, hollow, pale yellowish-green gall, always growing on the under side of the leaf, and almost always from one of the side-veins, very rarely (1 specimen) from the mainrib, and attached to the leaf by only a minute portion of its surface, .18—.28 inch in diameter, and a few, which were probably immature or abortive, only .08 inch in diameter. Almost invariably there is but one gall to one leaf; but on 4 leaves there were two, and on 2 leaves three of them, and occasionally two are confluent. The surface of the gall is without pubescence, in some smooth and even, in others a little shrivelled, generally studded in the medium-sized ones with 4—12 small, robustly conical nipples, which in the larger ones have burst into a scabrous brown scar. Only in 3 out of 62 galls was there any rosy cheek, as in *S. pomum*. The point of attachment is marked on the upper side of the leaf by a brown sub-hemispherical depression about .04 inch in diameter. Abundant but local. Described Aug. 25 from 62 freshly-gathered galls. At the time the 1st part of this Paper was published I was unacquainted with this gall, which accounts for the irregularity in the numbering, (21bis.)

On the same bush with the above there occurred 13 galls, mostly unbored, so identical in appearance with *S. pomum* that I did not think it worth while to attempt to breed from them. On Oct. 14, out of another lot of *S. pisum* on another bush of *S. discolor*, I found that about one-fourth to one-fifth had a slightly rosy cheek. On this bush also I met with 4 *S. pomum* in company with *S. pisum*, but all empty and bored, but whether bored by the Gall-maker or by the inquilinous *Anthonomus sycophanta*, n. sp. (Coleoptera) is uncertain. In both the above two cases a few *S. discolor* bushes were growing in the midst of

very large numbers of *S. cordata*, the species on which *S. pomum* is normally found. This gall is evidently allied to those produced by the European *Nematus intercus* and *N. gallarum*, which are described as "globose, spongy, pedunculated galls along the mainrib of the leaf;" (Westw. *Introd.* II, p. 105;) but it differs in growing, not exclusively from the mainrib, but indiscriminately from any of the veins. Distinct from *S. pomum* by its being peduncled not sessile, and by its smaller size and the general absence of a rosy cheek, and from *S. desmodioides* by its short peduncle and by its very different shape.

**Larva.** The larva on August 25 was apparently 18-footed, with 6 true legs, 12 abdominal prolegs on joints 5—10, but no anal prolegs that I could discover. When at rest, it elevated its entire abdomen behind the true legs in the air, as I notice to be the case, but only in the earlier stages of its life, with a 20-footed larva feeding on the leaves of *Salix nigra* Aug. 28, from which larva two weeks subsequently I bred six males and eighteen females of an undescribed *Messa*; and as is said to be also the habit of the 20-footed external-feeding larva of the European *Nematus ochraceus*, which also lives on the willow; (Westw. *Introd.* II, p. 104;) except that in these two cases the larva clasps the leaf with some of its anterior prolegs. The length of the larva, Aug. 25, was .17—.23 inch, the body being about six times as long as wide. Color whitish hyaline; head slightly tinged with dusky; mouth dusky; eye-spots circular and black. Anal segment equal in length to two of the others, and apparently divided in two by a transverse medial suture. The larva goes underground to transform; for after my first imago appeared, out of about 50 sound, unshrivelled galls, I found all but 3 bored and nothing remaining of them but a shell as thin as paper. And in those three, when subsequently opened, it appeared that the larva had perished when immature.

**Pupa** unknown.

**Imago.** *Nematus s. pisum*, n. sp.—♀ Shining greenish-white. *Head* with the eyes, a quadrate spot enclosing the ocelli, and extending behind on to the disk of the occiput, but not near reaching the antennæ in front, and separated from the eyes by a pretty wide orbit, a dot above the origin of each antenna, and also the tips of the mandibles, all black. Clypeus emarginate in a circular arc of about 90°. Labrum rounded at tip. Antennæ three-fifths as long as the body, joints 3—5 subequal, 6—8 slowly shorter and shorter, 9 as long as 8, the scape black, the flagellum brown-black. *Thorax*, including the basal plates, black, with the tegulæ and the entire collare, except a fuscous spot on each lower angle, all greenish-white. Cenchri whitish. *Abdomen* entirely black, except the venter, and a more or less distinct pale cloud towards the tip of dorsal joint 8; lateral plates black, except the tip of 8. Basal membrane whitish. Ovipositor concealed; its sheaths black. Cerci whitish tipped with dusky. *Legs* pale greenish-white, the tarsal tips, especially in the hind legs, and the extreme tips of the hind tibiæ, fuscous. *Wings* hyaline; veins black; stigma fuscous. Length ♀ .11—.14 inch; front wing ♀ .13—.17 inch.

♂ Differs from ♀ only as follows:—1st. The quadrate spot on the vertex is only separated from the eyes by a capillary orbit. 2nd. The occiput is black, except a narrow orbit. 3rd. The antennæ are 4-5ths (not 3-5ths) as long as the body, the scape black, the flagellum brown-black above, pale dull green beneath.



4th. The collare is black, except a pale line on its superior margin which is prolonged downwards under the wing on its hind margin. 5th. The lateral plates of the abdomen are black as in ♀, but the venter does not appear to be tipped with black as it does in ♀, because in this sex the lateral plates do not conceal its tip. Length ♂ .11—.13 inch; front wing ♂ .13—.14 inch.

Two ♂, three ♀, bred April 27—June 9. Distinct from the normal *S. pomum* ♂ ♀ and *S. desmodioides* ♂ ♀ by the darker coloration of the body ♂ ♀, and ♂ from *S. desmodioides* ♂ by the flagellum being pale below, which seems a pretty constant character in this family. From an undescribed, cabbage-like, polythalamous, Cecidomyidous gall on the White Oak (*Q. brassica* Walsh MS.), the structure of which is analogous to that of *Cecidomyia solidaginis* Loew, I bred, May 18—June 10, 2 ♂ 7 ♀ of an inquiline species—*Nematus quercicola*, n. sp.—which cannot be distinguished from the gallmaking *N. s. pisum* ♂ ♀. The habits, however, of the two insects differ remarkably in other respects also. For all my *N. s. pisum* went underground to pupize, and all my *N. quercicola* pupized in the gall. From certain described species *N. s. pisum* may be distinguished in the same manner as *N. s. pomum*. In the ♀ venter being pale and apparently tipped with black from the blackness of the lateral plates, the ♀ agrees with *Nem. corniger* ♀ Nort., the ♂ only of which species has been hitherto described, and differs from all other ♀ *Nematus* known to me, with the exception of *Nem. quercicola*, n. sp. We find the same character in *Euura s. gemma*, n. sp. In a single ♂ the 3rd submarginal cross-vein is represented only by a stump.

Genus **NEMATUS**.—Inquilines or Guest-flies.

**Nematus inquilinus**, n. sp.—♀ Shining honey-yellow. Head with the eyes, a quadrate spot enclosing the ocelli, not near attaining the antennæ, and separated from the eyes by a pretty wide orbit, and also the tips of the mandibles, all black. Clypeus emarginate in a circular arc of about 120°. Labrum prominent and rounded at tip. Occiput generally with a discoidal black cloud. Antennæ full  $\frac{1}{2}$  as long as the body, joints 3—5 subequal, 6—8 slowly shorter and shorter, 9 as long as 8, the scape black, the flagellum brown-black. Thorax with a broad vitta on the anterior  $\frac{3}{4}$  of the anterior mesonotal lobe, sometimes reaching to the scutellum, the whole of the lateral lobes, or sometimes only the interior  $\frac{1}{2}$  of each, the extreme base and tip of the scutellum, with sometimes a black line connecting the base and tip, the entire pectus, and part of the pleura, so as to leave above a large triangular honey-yellow spot of variable size, and a cloud on each lower angle of the collare, all black. Metanotum black, the basal plates occasionally with a discoidal honey-yellow cloud on each side. Cenchri whitish. Dorsum of the abdomen black, sometimes on all but the last joint, sometimes on two or three of the basal joints only, with two or three of the following sutures dusky, sometimes only on the base of joint 1 with three or four of the following sutures dusky. Lateral plates honey-yellow. Cerci honey-yellow tipped with dusky. Basal membrane yellowish-white. Ovipositor yellowish-

white; its sheaths black. *Legs* greenish-white, the hind legs sometimes pale honey-yellow. Tarsal tips, especially in the hind legs, and the extreme tips of the hind tibiae, obfuscated. *Wings* hyaline; veins black; costa and stigma pale dusky, the costa and the basal  $\frac{1}{2}$  of the stigma sometimes dull greenish-white. Third submarginal cell longer than wide. Length ♀ .22—.26 inch; front wing ♀ .24—.27 inch.

♂ Differs from ♀ only as follows:—1st. The black spot on the ocelli is much larger, attaining the antennae, and only separated from the eyes by a capillary orbit. 2nd. The disk of the occiput is black, leaving a pretty wide, pale orbit. 3rd. The antennae are  $\frac{3}{4}$  (not full  $\frac{1}{2}$ ) as long as the body, joints 6—9 (not 6—8) slowly shorter and shorter. 4th. The meso- and metanotum, tegulae and cenchri excepted, are entirely black. 5th. The dorsum of the abdomen (basal membrane excepted) is entirely black, and the lateral plates are basally black but terminally clouded with honey-yellow. 6th. The legs are greenish-white, the hind legs pale honey-yellow, and the whole of the hind tarsi dusky. 7th. The costa and stigma are black. Length ♂ .20 inch; front wing ♂ .21 inch.

One ♂, three ♀, bred April 17—18 from the Cecidomyidous gall *S. rhodoides* Walsh. Very like the pale variety of the gall-making *N. s. desmodioides* n. sp., but the ground-color is yellowish not greenish, the antennae ♀ are proportionally perhaps a trifle longer, and the average size is  $\frac{1}{4}$ — $\frac{1}{2}$  larger. Might be taken for *ventralis* Say, but that species has no triangular pale spot on the pleura, and the joints of the abdominal dorsum ♂ are described as being banded with yellow. Its size is also larger, viz. ♂ .25 ♀ .30 inch. From several other described species it differs as does *S. pomum* n. sp., and from *S. pomum* n. sp. by the large triangular pale spot on the pleura ♂ ♀ which it has in common with *S. desmodioides* ♀.

*Nematus hospes*, n. sp.—♂ ♀ Absolutely undistinguishable from the normal type of the gall-making *N. s. pomum* ♂ ♀, except that in ♂ the lateral plates of the abdomen are blacker, and as in some ♂ *S. pomum* the dorsal joint 1 in ♂ is lightly tipped with yellow. Length ♂ .17 inch; ♀ .18—.19 inch; front wing ♂ .18 inch, ♀ .20—.22 inch.

One ♂, two ♀, bred from the Cecidomyidous gall *S. strobiloides* O. S. April 7—8. On Feb. 20 I noticed a 20-footed larva burrowing in this gall, which probably belonged to *hospes*, or perhaps to *Euura perturbans* n. sp. which was also bred from that gall. It was about .20 inch long, of a greenish cinereous color, the head darker, with the usual eye-spots and the mandibles blackish; the legs porrect backwards and apparently impotent.

*Nematus mendicus*, n. sp.—♀ Pale grass-green. *Head* rufous around the ocelli, sometimes tinged with rufous throughout. Eyes, ocelli, a dot behind the ocelli and generally another at each end of a transverse carina half way between the anterior ocellus and the antennae, and sometimes a dot outside each antenna, and always the tips of the mandibles, all black. Clypeus emarginate in a circular arc of 90°—120°. Antennae slender, as long as the body, joints 3—5 subequal, 4 sometimes a trifle longer than either, 5 sometimes a trifle shorter than

either, 6—9 very slowly shorter and shorter; the scape black, with joint 1 sometimes pale rufous below, the flagellum brown-black, generally dull rufous or reddish-brown above, except towards the base, always bright rufous beneath, except at the extreme base. *Thorax* tinged with rufous, especially above; a coarse longitudinal line on the disk of each lateral lobe, sometimes with a dot inside its posterior end, and sometimes a slenderer longitudinal line on the front of the anterior lobe, a band near the tip of the scutellum, a pair of dots transversely placed in the hollow behind it, an abbreviated band on the succeeding carina, and generally in the hollow between the carina and the basal plate an abbreviated transverse line, and sometimes the edges of the basal plate bordering the basal membrane, all black. *Abdomen* sometimes tinged with rufous; joint 1 sometimes with the edge bordering the basal membrane, and an obscure dot on its dorsal tip, black. Ovipositor concealed; its sheaths tipped with fuscous. Cerci tipped with fuscous. *Legs* greenish-white; tarsi, especially the hind ones, fuscous; extreme tip of the hind tibiae more or less obfuscated. *Wings* hyaline; veins black; costa and stigma pale green. Length ♀ .22—.24 inch; front wing ♀ .23—.25 inch.

♂ Differs from the normal ♀ only as follows:—1st. The body is much slenderer in proportion than is usual in this genus. 2nd. The general color is whitish, not pale green. 3rd. There is a quadrate black spot enclosing the ocelli and running backwards on to the occiput, swallowing up the black dot on the occiput and confluent with the two black dots behind the antennæ. 4th. The antennæ are  $\frac{1}{2}$  longer than the body, joints 3—5 subequal, 5 a trifle the shortest, 6—8 very slowly shorter and shorter, 9 full as long as 8, the scape black, with joint 1 basally pale green, the flagellum rufous above, bright rufous beneath. 5th. The entire meso- and metanotum, excepting the pale tegulae and cenchri, but including the basal plates, is black. 6th. In the abdomen the basal  $\frac{1}{3}$ — $\frac{2}{3}$  of dorsal joints 1—6, nearly the whole of joint 7, and a dorsal line on joint 8, are all superiorly black; lateral plates all whitish; basal membrane whitish. Length ♂ .18 inch; front wing ♂ .19 inch.

One ♂, three ♀, one ♀ bred May 2 from the Tenthredinoid gall *S. pomum* n. sp. of the preceding year's growth, and another ♀, August 5, from the Cecidomyioid gall *S. brassicoides* Walsh of the same year's growth; the other ♀ and the ♂ captured at large. Most probably the larvæ already described (p. 255) as seen Sept. 9 in a jar of *S. pomum* galls belonged to *mendicus*. Comes very near *vertebratus* Say (1 ♀) and *integer* Say (2 ♀), but differs in the antennæ not being entirely black or fuscous, and in the transverse carina behind the antennæ being straight or nearly straight, while in *vertebratus* ♀ it is in the form of a widely truncate angle of 60°, and in *integer* ♀ it forms an angle of about 90° or 100° with its apex a little rounded so as to approximate to a curve. I notice further that *vertebratus* ♀, which in extent of black markings is intermediate between *mendicus* ♀ and *integer* ♀, differs from both in the clypeus being emarginate in a circular arc of only 45°, instead of 90°—120°. But for the above differences, the three species might be considered as varieties, some more highly colored than the others, as in *N. s. pomum* ♀.

**Nematus fur**, n. sp.—♂ Black. *Head* opaque, very minutely and closely punctato-rugose. *Clypeus*, labrum, the extreme tip of the cheek, and the base of the mandibles, all dull greenish-white. *Clypeus* emarginate in a circular arc of about 45°, with a small tubercle in the middle of its anterior margin. *Labrum* full as long as wide, its tip rounded. *Antennæ* black, 4-5ths as long as the body, rather more compressed than is usual in ♂, joints 4 and 5 equal in length, 3 shorter by  $\frac{1}{2}$ , 6-9 very slowly shorter and shorter. *Thorax* opaque, very minutely rugose, subpolished on the pectus; a pale subtriangular tubercle on the lateral margin of the black subpolished basal plate. *Cenchri* pale, but not obviously so. *Abdomen* subpolished, bright fulvo-rufous, the basal edge of joint 1 next the basal membrane, which is whitish, clouded with black. *Genitals* obfuscated. *Legs* black. *Wings* subhyaline, slightly tinged with fuliginous; veins and stigma black. Length ♂ .39 inch; front wing ♂ .38 inch.

One ♂, bred March 29 from an old bored subpeduncled spherical gall, .57 inch in diameter, made by *Cecidomyia s. batatas* Walsh on *S. humilis*; ♀ unknown. As the mother Saw-fly must have deposited her egg in this gall after the gall-maker had quit it or not long before, it is a question whether, if such be its general habits, this species can be properly considered as an Inquiline. On Feb. 26, however, I found in a recent gall of *C. s. batatas* a pale, greenish-white, Tenthredinidous larva, which may appertain to *fur*, unless it was the larva of *Euura perturbans* n. sp. which I bred from recent specimens of that gall. On April 14-23 I took on the same willow on which the above gall grows 3 ♂, which scarcely differ from *fur*, except in having the abdomen entirely black and the thorax subpolished, and also 2 ♀ ♀ apparently belonging to these ♂ ♂, which had a rufous abdomen. Whether these ♂ ♂ ♀ ♀ are varieties of *fur* or distinct species remains to be proved, but I incline to think them distinct. *Nematus luteotergus* ♂ Norton has honey-yellow, not black legs, and besides it is only  $\frac{1}{2}$  the size of *fur*. *Nematus erythrogaster* ♀ Nort. also has legs varied with white and rufous, and is only about  $\frac{2}{3}$  the size of *fur*. I know no other described species that approaches it.

Genus **PRISTIPHORA**.—Inquiline or Guest-fly.

**Pristiphora sycophanta**, n. sp.—♂ Black. *Head* polished, but sparsely and rather coarsely punctate. Face with a lofty but obtuse carina extending from between the antennæ to the clypeal suture. *Clypeus* squarely truncate. *Labrum* twice as wide as long. Mouth entirely black. *Antennæ* nearly as long as the body, black above, brown-black beneath, joints 3-5 subequal, 6-9 very slowly shorter and shorter. *Thorax* polished with fine shallow punctures. *Tegulæ* and *cenchri* dull yellowish. *Abdomen* polished with fine shallow punctures, sparse towards the base, more dense towards the tip. Basal membrane dull whitish. *Legs* whitish; coxæ, except their extreme tips, femora, tarsal tips, and in the hind legs the terminal  $\frac{1}{2}$  of the tibiæ and the entire tarsi, all black. *Wings* hyaline: veins black; costa and stigma dusky; first submarginal cross-vein obsolete in both wings, the antepenultimate cell receiving both

recurrent veins in the normal manner. Length ♂ .16 inch; front wing ♂ .16 inch.

One ♂, bred August 9 from a cocoon found, July 27, inside the Cecidomyioidous gall *S. brassicoides* Walsh of the same year's growth; ♀ unknown. Distinct at once from *Pristiphora grossulariæ* Walsh, the only other described N. A. species, by the 3rd joint of the antennæ being as long as the 4th, and by the much darker legs. In the structure of the face and clypeus it agrees remarkably.

#### COLEOPTERA.

##### MAKERS OF PSEUDO-GALLS.—Family CERAMBYCIDÆ.

No. 22. PSEUDO-GALL INORNATA.—On *Salix longifolia* and also on *Populus angulata* or Cottonwood. A rather sudden swelling on such of the main stems as are .50—1.25 inch in diameter, cracking open in two or three deep, irregular, scabrous, brown, more or less transverse, gaping, thick-lipped fissures. This is the appearance presented as early as August and until the following spring; but July 19 nothing is seen but a smooth elongate swelling of the stem, pithy inside, and without any cracks or roughness outside, and undistinguishable externally from the Tenthredinoidous gall *S. nodus* n. sp., in the form in which it occurs on the same willow later in the season. Very probably, however, as with many, if not with all *Saperda*, the larva is at least two seasons in arriving at maturity, and the normal appearance of the pseudo-gall is not assumed till the following season. The insect does not make its way out in spring through the deep cracks of this pseudo-gall, but each bores a hole for himself in the manner usual in this family. The gall on the Cottonwood is absolutely identical with the Willow-gall, and was recognized by myself as such at the first glance. It was found exclusively on young saplings. In both cases it was perfectly healthy plants that were attacked. Although this pseudo-gall weakens mechanically the stem upon which it grows, and to such an extent that it occasionally causes the stem to break in two with the wind, yet otherwise the stem never perishes, but on the contrary the wound is gradually healed and overgrown by fresh woody matter.

LARVA. July 19th the larva is .10 inch long, or less, and of a pale color. In the spring when it assumes the imago state it is much larger, and differs but little from other larvæ belonging to this genus.

PUPA unknown.

IMAGO. SAPERDA INORNATA Say (= *S. concolor* Lec.?)—May 20, 1864, I bred 5 specimens from the Willow pseudo-gall and many more subsequently. The following year from the Cottonwood pseudo-gall I

bred, June 2 and subsequently, numerous specimens of the same insect. A pair sent to Mr. Ulke were pronounced by him to be *S. concolor* Lec.; but as the insect agrees exactly with Say's description of *S. inornata*, and as LeConte professes to be unacquainted with this last species, (*Say's Works* II, p. 190), I believe *concolor* to be a mere synonym. The most careful authors are sometimes liable to overlook species which have been already described. Many years ago I pointed out to Dr. LeConte that the *Elater obesus* of Say, which he had failed to identify, (*Say's Works* II, p. 109,) was nothing but a pretty common species which, according to him, had been subsequently described by Germar as *Diacanthus acutipennis*, and which now forms the type of the new genus *Oxygonus* Lec. Here both Germar and LeConte failed to identify a species, which Say had circumscribed by a very remarkable character—the tooth on the middle of the tarsal ungues.

#### INQUILINES.—Family CRYPTOPHAGIDÆ.

**LOBERUS IMPRESSUS** Lec. Bred a single specimen Sep. 12 from the Cecidomyioidous gall *S. brassicoides* Walsh. This insect is considered rare, but it occurs abundantly in Illinois in winter-gathered moss. The genus must be carefully distinguished from another bearing the same name in *Telphoridæ*. I do not know which has the priority.

#### Family MYCETOPHAGIDÆ.

**LITARGUS 4-SPILOTUS** Lec. Bred a single specimen Aug. 30 from the Acaridous (?) gall *S. ænigma* Walsh. (See above page 227.)

#### Family CURCULIONIDÆ.

**Anthonomus sycophanta**, n. sp.—Brown-black. Head finely and rather sparsely punctate, except on the vertex, and with short appressed white hairs. A large impressed shallow puncture behind a line connecting the upper curve of the eyes. Rostrum  $\frac{1}{2}$  longer than the head and thorax together, curved in a circular arc of about 45°, finely punctate and rarely with its tip rufo-sanguineous; antennæ inserted 3-5ths of the way to its tip, rufous, the club obfuscated. Thorax with close-set larger punctures and long appressed white hairs, so as to appear opaque. Scutel rather longer than wide, generally white with appressed hairs, sometimes blackish or rufous. Elytra  $1\frac{1}{2}$  times as long as the head and thorax together exclusive of the rostrum, punctate-striate with large punctures, the interstices with fine rather sparse punctures and white hairs, so that the whole elytrum appears opaque; rufo-sanguineous, sometimes dark sanguineous, rarely verging on to luteo-sanguineous, sometimes with a cloud round the scutel and also the interior edges of the suture, brown-black. All beneath tinged with white from short appressed white hairs. Legs dark rufo-sanguineous, the knees and sometimes the entire leg, brown-black. Length exclusive of the rostrum .08—.12 inch.

Eighteen specimens; eleven bred from the Tenthredinidous gall *S. pomum* n. sp., five from the Tenthredinidous gall *S. desmodioides* n. sp., one cut out of the Tenthredinidous gall *S. nodus* n. sp., and one captured at large. This species is the same shape and size as *Anthonomus scutellatus* Schönh. determined by LeConte, (which does not seem to differ from *A. erythropterus* Say,)\* but is distinguishable by the elytra being almost entirely red (not red only on the lateral tip) and opaque (not subpolished) from the sculpture of the interstices. I formerly considered *sycophanta* as a mere variety of *scutellatus*,\* and have spoken of it under that name. (*Proc. etc.* III, pp. 547 and 619.) But not only do they differ constantly, as has been already shown, but *scutellatus*\* is inquilineous in the Aphidian galls *Caryæglobuli* Walsh and *Caryæfoliæ* Fitch, in which its imago occurs as early as June 20—26, shortly after which time those two galls dry up to nothing; whereas, out of hundreds of specimens that passed through my hands, the earliest *sycophanta* were met with July 30, and then only in the gall itself.

There is still another *Anthonomus*, of the same size, shape, and nearly of the same sculpture as *sycophanta*, but differing in the head, (except the extreme tip of the rostrum which is black,) the thorax and the legs being of the same rufous color as the elytra, and in the thorax having a conspicuous linear vitta of white hairs extending from the white scutel to the head. Also, instead of an impressed puncture behind the eyes, there is an impressed stria between the eyes; but sometimes, just as in *sycophanta*, there is a blackish cloud round the white scutel, the blackish tint being occasionally prolonged along the suture. Of this species I dug (Aug. 9—18) four imagos and several larvæ out of an undescribed Cecidomyidous gall—*Cratægi plica* Walsh MS—on *Cratægus crus-galli*; always finding them unaccompanied by the author of the gall, and but a single *Anthonomus* in a single gall. And I have also 11 specimens of the same insect in my Cabinet, labelled as captured on the Thorn. In 1861 Dr. LeConte marked this species for me as “undetermined.” Hence, if hitherto undescribed, it may be named *Anthonomus cratægi*. Thus it appears that the same genus *Anthonomus* is inquilineous in Hymenopterous galls made by Sawflies, in Homopterous galls made by Plant-lice, and in Dipterous galls made by

\* It appears by a letter which I have since received from Dr. LeConte, that by some clerical error this insect was named by him for me as “*scutellatus* Schönh.” instead of its proper designation “*suturalis* Lec.” and that it is just as I have supposed in the text, identical with *erythropterus* Say. *Suturalis* (Lec. *Ann. Lyc.* 1824) has the priority over *erythropterus* (Say, 1831), and *scutellatus* is a distinct species.

Gall-gnats. A closet-naturalist, having any one of these galls containing *Anthonomus* submitted to his notice, would be apt to conclude, that it was the *Anthonomus* that made the gall.

On July 29 I found numerous larvæ and two pupæ of *sycophanta* in the Tenthredinidous gall *S. pomum* n. sp., a single individual only in a single gall, in every instance unaccompanied by any Tenthredinidous larva. Nearly one-half, out of a large lot of these galls opened at this date, were thus tenanted, most of them being bored for the exit of the beetle; but two days afterwards I found a single gall occupied by two *Anthonomus* larvæ in distinct cells separated by a thin partition, one cell bored and the other not. Except a single one, none of the galls containing *Nematus* larvæ were then bored. July 31 I found about 12 imagos of *sycophanta* in the gall *S. pomum*, one only in each gall; and August 13—29 I bred large numbers of them from these galls. From these facts I infer that this curculio, while in the larva state, must destroy the egg or the very young larva of the gall-making *Nematus*, just as *Anthonomus cratægi* n. sp. evidently does, and just as the larva of *A. scutellatus*\* gradually destroys the young plant-lice among which it lives; otherwise the two larvæ would coexist in the same gall. Westwood indeed records the fact, that a *Balaninus* "resides in the large and fleshy galls upon the leaves of Willows, occasionally in company with the larvæ of *Nematus intercus*," (*Intr.* I, p. 342,) which last insect he afterwards names as the maker of the gall, stating further that the gall is monothalamous, not polythalamous. (II, p. 105.) But out of hundreds of *S. pomum* that I have opened, I never found the *Anthonomus* larva "in company" with the *Nematus* larva, if by the phrase "in company" is to be understood, that the two insects occur together in the same individual gall, and not merely in the same lot of galls. On July 30 I found two *sycophanta* imagos in the Tenthredinidous galls *S. desmodioides* n. sp., and many others subsequently. And on Aug. 28 I found a single *sycophanta* imago still remaining in the Tenthredinidous gall *S. nodus* n. sp., many of the other galls being bored and empty, from which no doubt the beetle had already made its exit.

*Anthonomus tessellatus*, n. sp. Rufous, opaque and pulverulent with numerous fine, short, appressed, white hairs or elongated scales. Head finely and densely punctured; a large puncture between the hind edges of the eyes, which is prolonged between the eyes in a longitudinal stria. Rostrum free from hairs, fully as long as the head and thorax together, arquated in a circular arc of 45°; antennæ rufous, inserted  $\frac{3}{4}$  of the way to the tip of the rostrum. Thorax more coarsely punctured,  $\frac{1}{2}$  wider than long, its sides convex, but slightly constricted

\* See the note on page 266.



behind, much and suddenly constricted before, the hairs laterally so dense as to give a silvery-white appearance there. *Scutel* small and never white. *Elytra*  $2\frac{1}{2}$  times as long as the head and thorax together, exclusive of the rostrum, more finely punctate than the thorax, and with shallow rather acute striæ irregularly punctate in common with the interstices, (which are flattish,) but not punctato-striate. Lateral margin whitish like that of the thorax: the remaining parts dotted with small irregular masses of white hairs arranged so as to appear almost tessellate. Beneath closely and more coarsely punctate with dense hairs. *Legs* with fine punctures and hairs. Length exclusive of the rostrum .11—-.13 inch, with the rostrum .140—.165 inch.

Forty-four specimens, three of which I bred in July from the Cecidomyioid gall *S. brassicoides* Walsh of the same year's growth, and April 19 I noticed one or two more sitting on these galls where they grew, being then of last year's growth. April 20, on beating bushes full of these galls, I obtained prodigiously large numbers. Specimens sent to Dr. LeConte were thought by him to be undescribed. Abundant as it was in April, I never met with it on any other occasion in the ordinary course of collecting, and I believe that the insect is not double-brooded, but that the July specimens were individuals that had attained maturity before the normal time, as with so many other insects, (e. g. the lepidopterous *Batachedra salicipomonella* Clem.; see below, and see also *Proc. &c.* III, p. 569.) A very constant species and easily recognizable by the tessellate appearance of the elytra, which resembles that of *Eirrhinus mucidus* Say. Differs from *scutellatus* Schönh. (= *erythropterus* Say?), \* *musculus* Say, *nigrinus* Schönh., *quadrigibbus* Say, *signatus* Say, (which I do not know), *prunicida* Walsh, and many other species, by the elytra not being punctato-striate, except where the general punctation happens to lie in regular series in the elytral striæ. It is also much more elongate than any described species known to me, except *prunicida*.

**Larva.**—On July 26 I found burrowing in the heart of the gall *S. brassicoides* of the same year's growth a curculionidous larva, which I have little doubt belongs to this species, or possibly to the following. Length .07 inch, the body usually curved in a semicircle and twice as long as wide. Color yellowish, but above mostly curdy white. Head honey-yellow; mandibles brown-black, robust, and almost equilaterally triangular with a subterminal tooth.

**ERIRHINUS EPHIPIATUS** Say. It may be added to Say's rather brief description, that the rostrum is as long as the head and thorax together, and is so nearly straight as to describe a circular arc of  $25^\circ$ . Antennæ inserted on the rostrum  $\frac{1}{2}$ — $\frac{3}{5}$ ths of the way to the tip. Thorax and elytra shaped as in *Anth. tessellatus*, but rather less elongate. The "slightly indented longitudinal line on the thorax" is an

\* See the note on page 266.

optical illusion caused by the hair parting there, and appears and disappears as the light is changed. Besides the two bands on the elytra mentioned by Say, there is a third irregular more or less distinct macular band near their tip. Length .08—.11 inch, exclusive of the rostrum, which in all my specimens is depressed; .10 inch according to Say, nothing being said about the rostrum.

Ten specimens, one of them bred Aug. 11 from the Cecidomyioidous gall *S. brassicoides* Walsh, the rest captured at large. The size of the elytral bands varies slightly, but on the whole it is a pretty constant and well-marked species.

*Apion lanuginosum*, n. sp.—♂? Black. Head finely and closely punctate except on the glabrous vertex, and with fine, short, appressed, white hairs; rostrum strongly punctate, except at the extreme tip, but without hairs, basally opaque, terminally subpolished, as long as the head and thorax together, cylindrical throughout, arquated in a circular arc of 45°, thrice as long as wide when viewed laterally, the antennæ inserted 2-5ths of the way to the tip. Thorax closely and more coarsely punctate, with very long, rather dense, partially erect, white hairs; as long as wide, its sides behind the middle parallel or scarcely converging towards the scutellum, before the middle converging in a concave circular arc of about 30°, so that the thorax is 1-5th narrower before than behind. Elytra about 1½ times as long as the head and thorax together, exclusive of the rostrum, punctato-striate, the striae deep, the punctures large but not obvious, the interstices rounded and very finely punctato-rugose, with very long, rather dense, partially erect, white hairs. Legs and all beneath, black, with fine and short appressed white hairs. Length, exclusive of the rostrum, .07 inch.

Two ♂ (?) specimens, bred Aug. 22 and 29 from the Cecidomyioidous gall *S. strobiloides* O. S., and also 1 (♂?) specimen captured at large in company with 2 out of 9 ♀ (?), all of which 9 differ from the description only in the rostrum being ¼ longer than the head and thorax together, and 4½ (not 3) times as long as wide when viewed laterally, and in its having the antennæ inserted scarcely 1-3rd (not 2-5ths) of the way to the tip. I observe similar sexual differences, but much more obvious, in many *Balaninus* which I have taken in coitu belonging to *nasicus* Say and *sparsus* Schönh., and the same thing is well known to occur in *Arrhenodes septentrionis* ♂ ♀ Hbst. *A. lanuginosum* differs from *A. rostrum* Say, *A. pennsylvanicum* Schönh. and 5 or 6 other species in my collection, by the white hairs giving the insect a distinctly gray appearance, as in *A. segnipēs* Say; from which species, however, it is separated at once by the rostrum not being basally thickened and by the legs not being partly rufous. From the description of *A. porcatum* Schönh. it differs also in the cylindrical rostrum, and from that of *A. reconditum* Schönh. in being black, not brassy-black.

So far as I can judge at present, there are very numerous Phytophagic species of this genus, that cannot be satisfactorily separated without breeding large numbers of each from its peculiar food-plant. Dr. LeConte tells me that his collection comprises no less than 35 N. A. species of *Apion*.

#### Family GALERUCIDÆ.

*HALTICA ALTERNATA* Illig. Bred one specimen of the Phytophagic variety with the elytral vittæ subobsolete, (*Proc. etc.* III, p. 404,) Aug. 6, from the Cecidomyidous gall *S. brassicoides* Walsh of the same season's growth, and captured another at large on that gall about the same date. The six specimens with the elytral vittæ distinct but narrow, spoken of (*ibid.*) as captured on that gall, proved on a more careful examination to belong to *H. punctigera* Lec., a closely allied but very distinct species.

#### Family CHRYSOMELIDÆ.

*PARIA SEX-NOTATA* Say. Bred one specimen, Aug. 14, from the Cecidomyidous gall *S. brassicoides* Walsh of the same season's growth.

### ORTHOPTERA PSEUDONEUROPTERA.—INQUILINES.

#### Family PSOCIDÆ.

*PSOCUS RUFUS* Walsh. A single specimen of this rare species was bred by me, Sep. 2, from the Cecidomyidous gall *S. brassicoides* Walsh of the same season's growth.

### LEPIDOPTERA.—INQUILINES.

#### Family ÆGERIADÆ.

*Trochillum hospes*, n. sp.—♂ Blue-black. Head with wide interior orbits and also the lower part of the face, silvery-white. Antennæ blue-black, with the 1st joint beneath, as also the palpi, except their last joint above, golden-yellow. Thorax with the edges of the shoulder-covers, and the mesothoracic pleura, golden-yellow. Abdomen above with a very narrow band  $\frac{1}{2}$  the way, and a rather wider one  $\frac{1}{2}$  way to the tip of the abdomen, and also the lateral edges of the caudal brush, all golden-yellow. Venter with the extreme base and a large spot in the middle occupying about 3 joints, golden-yellow. Legs golden-yellow. Front legs with the outside of the femora, black on their basal  $\frac{1}{3}$ , and the tips of the tibiæ and the tarsal incisures, all blackish in certain lights. Four hind legs with the coxæ, except their extreme tips, the outside of the femora, the tips of the tibiæ, and in the hind legs their extreme base also, and in certain lights the tarsal incisures, all blue-black. Wings hyaline; front wings with a band on the arc and a broad terminal one, streaked with golden-yellow between the veins, blue-black; both wings with the costa partly golden-yellow and the fringe brown-black. Length ♂ .28 inch. Expanse ♂ .57 inch.

One ♂, bred June 2 from the Coleopterous Pseudo-gall *S. inornata* n. sp.; ♀ unknown. On July 4 from a rough, black, woody, undescribed, polythalamous twig-gall occurring sparingly and sparsely, (not abundantly and locally like *Q. podagræ* Walsh,) both on the Black and Red Oaks, (being the same gall from which I bred the Gall-fly referred to by Osten Sacken, *Proc. etc.* IV, p. 365, note,) I bred a ♂ differing from the above only in having the collar slenderly yellow and the extreme tip of the central hairs of the caudal brush distinctly yellow. From a very similar rough, black, woody gall (?), occurring locally and abundantly on the twigs of the Pignut Hickory—the origin of which gall (?) I cannot at present ascertain\*—I also bred many years ago a damaged ♂ specimen, which agrees with that bred from the Oak-gall in the characters which separate it from *hospes*. Whether these two last be a mere variety of *hospes* or a distinct species, can only be shown by additional ♂ specimens.† *Hospes* differs from the description of *pyri* Harris by the silvery-white orbits and face, by the basal joint of the antennæ being yellow beneath, by the collar not being yellow, (though it is so in the Oak-gall specimen,) and by the yellow band on the middle of the abdomen being as narrow as in *tipuliforme*, not “broad,” as it is described by Harris, or proportionally thrice as broad as in *tipuliforme* as it is figured in Harris’s *Injurious Insects*. (Plate V, fig. 5.) From the description of *scitulum* Harris it differs precisely in the same way, except that that species is described as having “the front and orbits covered with silvery-white hairs.” I notice that *tipuliforme* has the interior orbits silvery-white, though Harris, as quoted by Morris, (*Synops.* p. 140,) omits this character in his description. Possibly, therefore, he may have omitted it also in *pyri*. But, judging from *tipuliforme* ♂ ♀ and *exitiosum* ♀, the width of the abdominal yellow bands is in this genus a pretty constant character.

#### Family NOCTUADÆ.

A most surprisingly variable species, as yet undescribed, and expanding only .47—.69 inch, which was originally thought by Dr. Cle-

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\* Baron Osten Sacken, to whom I have sent specimens, thinks that it is a fungus.

† On Oct. 4, 1866 I bred what is apparently the ♀ of *hospes* from the woody excrescence on the Pignut Hickory of the same year’s growth. It differs from the described ♂ only as follows:—1st. The orbits are narrow, not wide. 2nd. The first joint of the antennæ is immaculate. 3rd. The yellow ventral spot is only about half as long. 4th. The lateral fasciculus of the caudal brush, as usual in ♀ *Trochilium*, is much shorter and thinner, but it is still distinctly yellow on its exterior half. Length ♀ .26 inch. Expanse ♀ .50 inch.

mens to belong to *Tortricidæ*, but was finally decided by him to belong to *Noctuidæ*, was bred by me, Aug. 1—23 and subsequently, in prodigious numbers from the Cecidomyioidous gall *S. brassicoides* Walsh, and a single specimen from the Acaridous (?) gall *S. ænigma* Walsh,\* both of the same season's growth. This is the insect referred to in the note *Proc. etc.* III, p. 609.†

#### Family TORTRICIDÆ.

**HEDYA SALICICOLANA** Clem. Bred in very large numbers from the Cecidomyioidous gall *S. rhodoides* Walsh of the same season's growth, July 27—Aug. 22 and subsequently. Dr. Clemens, following Latreille's example, never gives any dimensions in his descriptions, and I, therefore, here and elsewhere supply the deficiency. Alar expanse .33—.42 inch.

**HEDYA SALICIANA** Clem. Bred many from the Cecidomyioidous gall *S. brassicoides* Walsh, Aug. 1—18, and from the Cecidomyioidous gall *S. strobiloides* O. S., Aug. 1—13, both galls of the same season's growth. Expanse .37—.44 inch.

**CRÆSIA GALLIVORANA** Clem. Two specimens (♂ ♀?) bred from *S. brassicoides* of the same season's growth, Aug. 14 and 24. Expanse ♀ .77 inch, ♂ considerably less. By some clerical or typographical error, the specific name is printed "*gallicolana*" twice over in Dr. Clemens's description.

**PERONEA GALLICOLANA** Clem. Bred 12 specimens from *S. strobiloides* Aug. 27—Sep. 11, and one from *S. brassicoides* Sep. 11, both galls of the same season's growth. Expanse .50—.62 inch.

**N. B.**—*Euryptychia salignana* Clem. (alar expanse .80 inch) is erroneously stated in Dr. Clemens's description to have been bred by me from a Willow-gall, my letter containing the account of that species having been unfortunately mislaid, and is named accordingly. (*Proc. etc.* V, p. 141.) In reality it was bred in the middle of June from a gall on Solidago (Golden-rod), the same which is referred to by Osten Sacken *Proc. etc.* I, 369. The *Trypeta* gall which Osten Sacken describes in this passage is well known to me, as well as the Dipterous

\* See above, page 227.

† In the very last letter which I received from Dr. Clemens, previous to his lamented death, Jan. 11, 1867, he informed me that he had been working on a Synoptical Table of Guenée's *Noctuélites*, and had come to the conclusion that this insect belonged to an undescribed genus. It may assist in identifying it hereafter to state, that I had provisionally named it *protecella*, and it is probably so labelled in the Clemens Collection.

insect which produces it, and it is quite different from the other gall, being roundish and filled, except a central cell, with white sponge, not elongate-oval and with thin walls like the other. But from a gall on the same plant, and also on the allied Compositous plant *Vernonia fasciculata*, which is externally like the Lepidopterous gall, but is internally filled with brown sponge and numerous cells, I have bred many specimens of *Lasioptera solidaginis* O. S., a minute Cecidomyidous fly. Whether this Dipteron is inquiline in the Lepidopterous gall, or the Lepidopteron in the Dipterous gall, or whether the two galls are distinct and both the Dipteron and the Lepidopteron are gall-makers, I cannot say with any certainty; but on mature consideration of all the facts now known to me, I incline to the last supposition. As to the burrows in the *Trypeta* galls noticed by Osten Sacken in the above passage, they are probably made by an inquiline Sawfly; for I found, Dec. 25, a living Tenthredinidous larva, .18 inch long, burrowing in one of these galls, without at all interfering with the health and prosperity of the obese tenant of the central cell.

#### Family TINEIDÆ.

**GELECHIA FUNGIVORELLA** Clem. Bred many from the gall *S. brassicoides* Walsh, Aug. 1—15, and a few from *S. rhodoides* Walsh, (not *S. strobiloides* O. S. as erroneously stated by Clemens,) Aug. 14, both galls being Cecidomyidous and of the same season's growth. Expanse .38—.49 inch.

**GELECHIA GALLÆGENITELLA** Clem. Two specimens were bred from *S. brassicoides* Aug. 7, and two more, pronounced by Dr. Clemens to be identical, were bred July 2 from the Cynipidous gall *Q. spongifica* O. S., both galls of the same year's growth. Expanse .38—.45 inch. I have since bred two more from last year's specimens of the Cynipidous gall *Q. ficus* Fitch (= *Q. forticornis* Walsh) April 18 and 26. Hence the species would seem to be double-brooded.

**GELECHIA SALICIFUNGIELLA** Clem. Bred six specimens from *S. brassicoides* of the same year's growth Aug. 3—13. Expanse .57—.60 inch.

**BATRACHEDRA SALICIPOMONELLA** Clem. Bred many from the Tenthredinidous gall *S. pomum* n. sp. May 8—20, one from the Tenthredinidous gall *S. desmodioides* n. sp. April 9, and one from the Cecidomyidous gall *S. rhodoides* Walsh, May 11, all from galls of the preceding year's growth; also a single specimen Aug. 28 from *S. pomum* of the same year's growth. Expanse .35—.45 inch.

## HETEROPTERA.—INQUILINES.

## Family LYGÆIDÆ.

ANTHOCORIS [*Reduvius*] INSIDIOSUS Say (= *Anthocoris pseudo-chinche* Fitch.) Both larva and imago occur very abundantly on *S. brassicoides* in the summer, and more sparingly on *S. rhodoides* and *S. strobiloides*, all three galls being Cecidomyioidous and of the same year's growth. I have also noticed a few larvæ and imagos on *S. ænigma*, and a single larva, Aug. 1, on a leaf covered by *S. semen*; the above two galls being Acaridous and of the same year's growth. This insect is very common, and sometimes occurs under the husks of the ears of maize in the autumn, in company with the notorious Chinch-bug; (*Micropus leucopterus* Say;) for which, to my personal knowledge, it is sometimes mistaken by Agriculturists, although it is only half as large and very differently shaped. Dr. Fitch mentions that, in one instance, it had actually been sent him by a correspondent as the Chinch-bug, whence his specific name. (*N. Y. Rep.* I, p. 294.) Say's description is defective in not stating, that the hind legs are entirely brown-black. What Fitch calls the "variety *semiclarus*" of his *pseudo-chinche*, i. e. with the posterior half of the hemelytral membrane fuliginous, is possibly *Anthocoris [reduvius] musculus* Say, a very similar but larger and proportionally longer insect, with the hemelytral tips normally fuliginous, and with the tips of antennal joints 2 and 3 and the whole of joint 4, brown-black, the rest of the antenna being pale. The antennal joints, it may be added, are proportioned as in *insidiosus*. Say's specimen of this last species had lost its antennæ, and consequently they are as yet undescribed.

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The study of the various Families of gall-producing insects is peculiarly interesting and peculiarly important just now, because it throws considerable light upon the great questions of the day—What is a species? Wherein, if at all, do species differ from varieties? How is one species essentially distinguishable from another? And what was the origin of species? Ordinarily, when we compare together two closely-allied animals, we can only compare them in regard to the different states, that intervene between the earliest embryo and the completely developed adult. This is a strictly zoölogical test. But in the case of the gall-making insects we have, in addition, a botanical test of the highest value; for the characters of the gall are frequently of far more practical importance for the distinction of species, than those of the egg, larva, pupa and ♂ ♀ imago all put together. For example,

1st. Certain Willow Gall-gnats, which can be readily distinguished by the galls produced by them, are undistinguishable, as I have shown at great length, in all states of the insects themselves. 2nd. The gall *caryæcaulis*, Fitch, grows on the upper surface of the leaf-stalk of a Hickory, (or sometimes, as is correctly stated by Fitch, upon the young succulent twigs of the same year's growth,) and opens above when ripe, to allow the Plant-lice which it contains to escape, by a slit that is usually decussated, or in the form of a +; and this gall often attains quite a large size, say fully  $\frac{1}{2}$  inch in diameter. On the other hand the gall *caryæglobuli* Walsh grows on the leaflet of the same Hickory, and when ripe, opens below, not above, and always by a simple longitudinal slit, as is the general, though not the universal rule in Aphidian galls, *caryæfoliæ*, for instance, opening above at the apex of the conical figure which it presents on the upper surface of the leaflet; and this gall—*caryæglobuli*—never exceeds  $\frac{1}{2}$  or  $\frac{1}{3}$  the extreme diameter of *caryæcaulis*. Yet the *Phylloxera*\* produced from these two very distinct Hickory galls are absolutely undistinguishable, either by size, shape, structure or coloration, even when numerous specimens of each are placed side by side. (*Proc. etc.* II, p. 462.) It may be thought, perhaps, by those who do not know how constant and invariable a thing a Gall is, and how definitely all its characters are determined by the insect which gives origin to it, that the same insect produces in this particular case a different gall, according to the location of that gall, whether on the stem of the leaf or on the blade of the leaflet. But—not to rely exclusively on the fact, that *caryæcaulis* galls located on the twig are precisely like those on the leaf-stalk—there is another remarkable example, which shows that this can scarcely be so. The Cynipidous gall *Q. ficus* Fitch is, not a bud-gall generated by the deformation of a bud or buds, but a true twig-gall, a mass of subglobular galls about the size of peas being clustered so densely round the infested twig, without in any wise interfering with the normal development of the buds, that, except on the outskirts of the mass, they usually press against one another so closely as to become each 3, 4 or 5-sided. In fact, to make use of Dr. Fitch's graphic comparison, from which he derived his specific name, they closely resemble a mass of round figs, pressed together in the box in which they are packed so as to become many-sided instead of round. Now I have noticed five or six instances, where the mother insect, when depositing her eggs with the accompanying drop of poison in November towards the tip of a

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\* Respecting this genus, see the note a few pages below.



twig, had evidently "slopped over," so to speak, when she came to the terminal leaf-bud, and had laid a few eggs in the base of the embryo-leaves of that leaf-bud. The consequence was that, when the galls reached their full growth in the following August, there were a few strung along at considerable intervals on the base of one or two of those leaves, that had developed from the terminal leaf-bud since the eggs were laid in the preceding autumn. Here, then, if anywhere, we might expect to find a change in the characters of these wrongly-located galls, produced by mistake in a part of the tree where naturally they had no business to be. But what was the fact? In every one of these five or six cases they were precisely like the outlying galls of a normally located mass of *Q. ficus* galls, differing only from the central ones in being round and not many-sided. They were alike in color, alike in texture, alike in containing internally a mass of very fine, woolly, interlaced fibres, with a central cell located close to the short peduncle of the gall; (for these galls are not "hollow," as is incorrectly stated by Fitch and re-stated by Osten Sacken;) finally they were precisely alike in size. Yet, as the change in location in this example was the greatest possible, namely, from a twig to a leaf, here, if anywhere, we might have expected some little variation in the aberrant gall. Is it likely, then, that when the change in location is merely from one part of a leaf to another, namely, from the footstalk to the leaflet, we should meet with fundamental differences in the structure and size of the same identical gall, as we must assume to be the case, if we assume that *caryæcaulis* Fitch and *caryæ globuli* Walsh are produced by one and the same species of *Aphidæ*? Moreover, *caryæcaulis* is comparatively rare near Rock Island, Illinois, and *caryæ globuli* very common, while on the contrary Dr. Fitch found *caryæcaulis* very common and was entirely unacquainted with *caryæ globuli*.

3rd. An inquiline Saw-fly—*Nematus hospes* n. sp.—which inhabits a Willow-gall made by a Gall-gnat, is undistinguishable from a true gall-making Saw-fly—*Nematus s. pomum* n. sp.—which I have bred very extensively from a well-marked Willow-gall. (See above, p. 261.)

4th. *Nematus quercicola*, n. sp. (see above, p. 260), which is inquiline in a Cecidomyidous bud-gall on the White Oak, positively cannot be distinguished, when the two are placed side by side, from *Nematus s. pisum* n. sp., which makes a leaf-gall on *Salix discolor*.

5th. Many specimens of another inquiline Saw-fly—*Euura perturbans* n. sp.—which I have reared from a variety of different galls made by Gall-gnats, are absolutely undistinguishable from specimens bred by myself of the gall-

making *Euura s. ovum* n. sp., which inhabits a certain well-characterized Willow-gall. (See above, p. 254). 6th and lastly. In the case of *Cynips q. spongifica* O. S. and *C. q. inanis* O. S., the ♂ ♀ gall-making imagos, produced in the same month of the year from very distinct galls occurring exclusively on very distinct Oaks, cannot be distinguished in any way from one another when placed side by side, as both Osten Sacken and myself have clearly ascertained.\*

The general rule with all gall-making insects seems to be, that each particular species is confined to one particular species of the genus or genera of plants, inhabited by the particular genus of insects to which it belongs. But there are very numerous exceptions to this rule; and those in the family *Cynipidæ* will be found collected together in the first part of this Paper, where it is shown that even then the *Cynips* always restricts itself to one or other subgenus or section of the botanical genus *Quercus*. (Pp. 638—9, note; see also Osten Sacken's fourth Memoir on *U. S. Cynipidæ*, *Proc. etc.* IV, p. 342.) Now it is a most remarkable fact, that in all these cases, so far as known to me—and I could now add some others to the list—the galls, although they occur on different Oaks, are absolutely undistinguishable; and under similar circumstances the same thing is true, so far as my experience extends, of Cecidomyidous galls, † of Aphidian galls, ‡ of Tenthredinidous galls, ||

\* The specific distinctness of these two *Cynips* has been questioned by Dr. Reinhard of Germany, but I hope to prove it in a second Paper on Dimorphism in *Cynipidæ*. Dr. Reinhard's suggestion is that they may both of them be inquilines, belonging to the same species.

† Galls *S. strobiliscus* Walsh, (doubtful) on *Salix rostrata* and *S. discolor*: *S. gnaphalioides* Walsh on *S. humilis* and *S. discolor*: *S. siliqua* Walsh on *S. humilis*, *S. discolor*, *S. rostrata*, *S. cordata* and *S. petiolaris*: *S. batatas* Walsh on *S. humilis*, *S. discolor* and *S. cordata* (?): *S. verruca* Walsh on *S. humilis* and *S. discolor*: and a precisely similar gall on *Solidago* (sp. ignot.) and *Vernonia fasciculata* producing from each *Lasiopoda solidaginis* O. S., which may, however, possibly be an inquiline and not a gall-maker. (See above, p. 273.)

‡ Gall *vagabunda* Walsh, on *Populus angulata* and *P. balsamifera*. The Hickory galls *caryæcaulis* Fitch, *caryæfolia* Fitch and *caryæ globuli* Walsh (all three formed by Aphidians) occur, so far as I have observed, locally and abundantly on the Shag-barked Hickory, (*Caryæ alba*), and scarcely ever on the Pignut Hickory, (*C. glabra*), but on whichever species of Hickory they occur, they are exactly alike. The gall *ulmicola* Fitch (which I have shown to be made by a *Thelaxes* ?) occurs, so far as I can perceive, only on the White Elm, (*Ulmus americana*), or, as I incline to believe, on an undescribed species of Elm, which has a leaf intermediate in roughness between those of the White and Red Elm, (*U. fulva*), never exceeds 25 or 30 feet in height, has a much more upright habit than either the White or the Red Elm, has timber easily split, instead of remarkably tough and locky as in the case of the White Elm, and is popularly known in the West as "Hickory Elm." The case of an Aphid-

and even of Coleopterous Pseudo-galls.\* It will be contended perhaps that I am arguing in a circle, and that when, as in the case of Baron Osten Sacken's two *Cynips*, the galls are quite different and the insects exactly alike, then I consider the insects as distinct species; and when both the galls and the insects are exactly alike, then I consider the insects as the same species, thus in effect assuming the existence of the very criterion which I am attempting to prove. But there are no intermediate grades between these two cases to prove their similarity; which would inevitably take place if the criterion in question had no real existence in Nature. Osten Sacken's two Oak-galls, for instance, are so totally unlike each other internally, that out of a thousand specimens of each it would be impossible to find any two, that the most ignorant person would be likely to confound; and the same thing may be said, with occasionally a few grains of allowance, of the other instances adduced above. (§§ 1st and 2nd.) Whereas in the other class of cases, where, in galls made by Gall-flies, Gall-gnats, Plant-lice, and Saw-flies, both the galls and the insects are alike, the galls that occur on different species of the same genus of plants resemble one another so closely, that, on the most attentive study of very numerous specimens, no constant distinctive character whatever can be discovered. Nay, it has even been found by Dr. Ratzeburg, as quoted by Osten Sacken, that a European Gall-fly, *Cynips fecundatrix*, inhabiting normally a European species of Oak, produced the very same kind of galls when it attacked some American Oaks in his garden, that it produced on the European Oak. (*Proc. etc.* I, p. 248.)

But even if we tide over the difficulty, by assuming that all the similar pairs of gall-makers producing distinct galls are identical, what can we do with the 3 examples referred to above among the Saw-flies, where the inquilinous species are apparently identical with gall-making species? (§§ 3rd—5th.) Are we to believe that each of these 3 pairs of so-called species are really identical, and that one and the same species sometimes makes galls for itself, and sometimes inhabits a variety of totally distinct galls made, not by Saw-flies, but by Gall-gnats? I

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dian, inhabiting undistinguishable galls on two distinct species of *Rhus*, will be noticed below.

‡ Gall *S. pomum* n. sp. on *Salix cordata* and *S. discolor*, (the imago not reared from the latter); *S. ovum* n. sp. on *S. cordata* and *S. ovulum* n. sp. on *S. humilis*. (Most probably distinct species; the imago not bred from the latter and the larvæ constantly of a different ground color.)

\* Pseudo-gall *isornata* n. sp. occurring both on *Salix longifolia* and on *Populus angulata*.

could as soon believe, with the schoolboy in the story, that sometimes the Earth went round the Sun and sometimes the Sun went round the Earth. I could as soon believe, contrary to all ornithological authority, that the European Cuckoo or our North American Cowbird sometimes builds a nest for itself and sometimes oviposits in the nests of other birds. I could as soon believe, that the bees belonging to the genera *Nomada* and *Cœliorys* sometimes build and provision nests for their own young, and sometimes surreptitiously oviposit in the nests of *Halictus* and *Megachile*. But, unless we believe in such anomalies as these, we are bound to believe that perfectly distinct species may in the imago state be apparently identical, and that the galls form the only distinctive character between them. That these inquiline Saw-flies were primordially identical with the gall-making Saw-flies, and that Osten Sacken's two Gall-flies were primordially identical, and the undistinguishable Willow Gall-gnats were primordially identical, and the undistinguishable Aphidians *Phylloxera* (?) *caryæcaulis* Fitch and *Ph.* (?) *caryæ globuli* Walsh, were primordially identical—I fully concede. On no other hypothesis can I account for the fact of so many pairs of species being exactly alike, so far as the insects themselves are concerned; just as, when I find two copies of the same book exactly alike, I account at once for the fact by assuming that they were stricken off from the same types. But that is quite another affair from all these pairs of species being identical at the present day.

Negative facts are always more or less unreliable; but there is one negative fact, or rather bundle of facts, upon which I scarcely think that I can be mistaken throughout, though I may be, and doubtless am, mistaken in some few of the details. Not only is it the case, as I have already partly shown, (*Proc. etc.* III, p. 635,) that, when a given genus of gall-making insects occurs on a given genus of plants, it is very generally represented thereon—if we include exotic as well as domestic insects—by several species and often by very numerous species; not only is it the case, as I have already indicated elsewhere, (*Proc. etc.* I, p. 310, II, p. 461,) that each gall-making genus of true insects, with the single very remarkable exception of *Cecidomyia* and its subgenera, is, as a general rule, restricted to one single genus of plants; \* but it is also the case that—putting the gall-making *Cecidomyia* which

\* It matters little for my argument, whether we assume that these peculiar forms restricted to particular genera of plants are genera or subgenera or mere generic sections. It is sufficient that they are proved to be structurally distinct from other forms. The rest, after all, is more a question of words than a question of things.

are true insects, and the gall-making *Acaridæ* (mites) which are not true insects, out of the question—the gall-bearing genera of plants are themselves exceedingly limited in number. Take the different genera of North American trees and woody shrubs, for example, and—excluding all galls made by Gall-gnats and by Mites—count up all the other North American galls which are met with thereupon, entirely omitting all exotic galls. *Celtis* (Hackberry), as it will be found, has *three* galls, all Psylladous, and two of them and probably all three produced by what is probably an undescribed genus of the Homopterous family *Psylladæ*. (*Proc. etc.* II, pp. 461—2.) *Ulmus* (Elm) has *one* gall, produced by *Thelaxes* (?)\* a genus of the Homopterous family *Aphidæ*. *Populus* (Poplar) has at least three galls produced on *P. angulata* by *Pemphigus* (*Aphidæ*),† and two more, *populiglobuli* Fitch and *populivensæ* Fitch, produced on *P. balsamifera* by the same genus; besides two new species, evidently Aphidian, which I have found respectively on *P. tremuloides* and *P. grandidentata* (?), after the gall-makers had deserted them—thus making in all *seven* galls. *Hamamelis* (Witch-hazel), which is not found near Rock Island, Ill., has, according to

\* *Thelaxes ulmicola* Walsh. I suspect that I have erred in referring this insect to Westwood's genus *Thelaxes*, which is said to have the "anterior" one of the three discoidal veins bifid. In *ulmicola* it is the *posterior* one, or what may be less ambiguously termed the *terminal* one, that is bifid. Possibly, however, "anterior" may be a clerical error for "posterior." The European type of *Thelaxes* inhabits the Oak and not the Elm.

† I have hitherto erroneously referred these three species to *Byrsocrypta*, a genus founded by Haliday and apparently synonymous with *Tetraneura* Hartig, and which differs from *Byrsocrypta* as limited by myself by having only one, instead of two discoidals in the hind wing. I was led to separate generically these gall-making *Pemphigus* from certain root-inhabiting *Pemphigus* which I have described, 1st, because their antennal structure differed somewhat, and 2nd, because I was unwilling at that day to believe, that the same genus could contain both gall-making and non-gall-making species. But, 1st, I am informed by Baron Osten Sacken that the European *Pemphigus bursarius*, which also inhabits Poplar galls, has, according to Koch, antennæ like those of my root-inhabiting *Pemphigus*; and 2nd, as has been already observed, (*ante*, p. 237,) there are several groups, both Hymenopterous and Dipterous, that contain both gall-making and non-gall-making species, and there are even some groups, such as *Nematus* and *Cecidomyia*, that contain both Gall-makers, Guest-gallflies, and External Feeders.—I have described the gall of *Pemphigus* [*byrsocrypta*] *pseudobyrsæ* Walsh, as "entirely open below, the sides of the leaf bending down together so as to touch each other and conceal the opening." (*Proc. etc.* I, p. 306.) This is applicable only to the *mature* gall, when, as is usual with Aphidian galls, it opens out to allow the winged insect to escape. On May 20 the *immature* gall is completely closed, but, as usual, with a slit below; and at this date it contained one large apterous Aphidian and a few small larvæ. Hence this is a true gall, and not, as I inferred, a false or spurious gall.

Fitch, one gall, produced by an Aphidian which he referred to the genus *Byrsocrypta* in 1851. (*Catal. Homopt.* p. 69.) Baron Osten Sacken, however, has kindly informed me, that he long ago bred the winged insect from this same gall, and that it belongs to a new Aphidian genus which in 1861 he had proposed to call *Hormaphis*\* in allusion to the moniliform antennæ. *Pinus* (Pine), as I am informed by Baron Osten Sacken, bears at least one North American cone-like gall, produced by the Aphidian genus *Chermes*, besides others produced by the same genus in Europe. *Rhus* (Sumac) has at least one, and not improbably two galls, produced by a new Aphidian genus closely allied to *Pemphigus*, and differing from that genus chiefly in having 4-jointed, not 6-jointed antennæ.† *Cornus* (Dogwood) has, to my

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\* "This black *Aphis*, powdered with white, is characterized by the structure of its antennæ. The ring-like wrinkles upon the joints, which occur also in *Tetraneura*, are so deep here, that the flagellum appears to be moniliform, and the real size of the joints is not perceptible. This apparently new genus may be further distinguished from *Tetraneura* by the two first oblique veins forming a fork together. I propose for this genus and species the name of *Hormaphis hamelidii*." (Osten Sacken apud *Stettin. Entom. Zeitung*, 1861, p. 422.) The translation is by the author himself, who also informs me, that he was not aware at the time, that ten years previously Dr. Fitch had given the same specific name to the same insect. It is not often that conflicting synonymies are so happily avoided, by two different authors hitting on precisely the same specific name.

† In this genus, which may be called *Melaphis* in allusion to the fruit-like appearance of the gall, the typical two joints of the scape are soldered together so as to form one joint (the 1st), the typical joints 1 and 2 of the flagellum are soldered together so as to make one joint (the 2nd) nearly half as long as the rest of the antenna, and the 4th or last joint is at least as long as the 3rd, and bears, as in *Pemphigus*, a minute, terminal unguiculus, fore-shadowing the typical 7th joint found fully developed in *Aphis*. Dr. Fitch has recently described one species of this genus, under the name of *Byrsocrypta rhois*, in the *Jour. N. Y. State Agr. Society*, (Aug., 1866, p. 73,) referring it to *Byrsocrypta* rather than to *Pemphigus*, because, as he says, "out of five un mutilated specimens only two had hind wings with two oblique veins," the other three, I suppose, appearing to him to have but one oblique or discoidal vein in the hind wing. I have examined probably over two hundred specimens of this species, and find that every one without exception has two discoidal veins in the hind wings. Hence I cannot but suspect that Dr. Fitch's eyes must have deceived him on this point. The antennal joints are normally proportioned nearly as 1½, 5, 2, 3; but out of 28 recent specimens, in which I carefully examined both antennæ with a Coddington lens, I found that no less than 13 out of the 56 antennæ were distinctly 5-jointed, the very long 2nd joint being resolved into one long and one short one; thus proving that the 2nd joint is in reality, as stated above, formed by the confluence of joints 1 and 2 of the typical flagellum of *Aphidæ*. It may be added that the same individual often had one antenna 4-jointed and the other 5-jointed.

knowledge, one undescribed gall growing on the flower-cymes probably of *C. stolonifera*, the insect unknown to me, but the gall itself manifestly Aphidian. *Carya* (Hickory) has three galls, produced by a new genus closely allied to *Phylloxera* (*Aphidæ*,)\* and found almost exclu-

Dr. Fitch's description of the winged ♀ of this species applies only to immature specimens extracted from the gall. After they have been out some time, the legs and the whole body, except the collar which becomes very pale brown, turn to a decided black; and the stigma then is not "salt-white," but pale dusky with a whitish reflection. I am indebted to Dr. William Manlius Smith, of Manlius, N. Y., for my first acquaintance with this gall, which he has found abundantly in that locality for many years back on *Rhus typhina*. But I have since (Aug., 1866) met with numerous specimens myself near Rock Island, Ill., on *Rhus glabra*. He assures me—which I can readily believe—that Dr. Fitch is altogether mistaken in saying, that in young galls the larvæ are usually accompanied by a single winged female. In all Aphidian galls known to me the mother-louse is apterous, and has probably hibernated either in the egg or larva state.

There is another and a much larger and very distinct species of this genus *Melaphis*, of which Dr. Smith took a single female early in June on a sumac leaf in a clump of Sumacs. Soon after capture this individual gave birth on Dr. Smith's finger, to what was so completely enveloped in a thin membrane, that it seemed at first to be an egg under the lens, though it shortly afterwards developed into a larva. He informs me that he has since repeatedly noticed the same phenomenon in winged specimens of *Melaphis rhois* freshly escaped from the gall; and Curtis observed the same thing in England in the case of an *Aphis* found on the turnip. (*Farm Insects* p. 65.) As this female captured in June, which through Dr. Smith's kindness is in my collection, differs from *M. rhois*, not only in being fully twice as large, but in the stigma being scarcely longer than wide, instead of 3—3½ times as long as wide, I infer that it is a distinct species, inhabiting the Sumac and coming out in the winged form in June instead of September. It may possibly be an external feeder, or it may make a gall on Sumac distinct from that of *M. rhois* and probably a root-gall, as Dr. Smith was unable, on careful search in the open air, to find any other Sumac-galls than those of *M. rhois* in the vicinity of the spot where he captured the specimen.

Dr. Smith has kindly referred me to an Article by Prof. Archer of England, reprinted in the *American Journal of Pharmacy*, April, 1865, from which it appears that there are two Chinese, one Japanese, and one Indian gall, growing on different species of *Rhus*, and apparently analogous in their structure to our American sumac-gall. In regard to one of the Chinese galls, supposed to grow on *Rhus semialata*, and called "Woo-pei-tze," it is stated that "Mr. Doubleday, the entomologist, has shown that it is caused by an *Aphis* and not by a *Cynips*;" and I have little doubt that all these exotic sumac-galls are Aphidian. It would be very interesting to know whether the Plant-lice found in them are generically related to ours. The galls themselves are described as some of them like a radish-pod, some like an ox-horn and 2—2½ inches long, and some "branched" and apparently like a stag's horn. Our species is a good deal like a common tomato, whence I had given it the MS. name of *Rhois tomatas*.

\* This genus differs from the European *Phylloxera* (which inhabits the Oak)

sively on the Shell-bark (*C. alba*) in June; besides an undescribed gall (*Caryæ pilula* Walsh MS.), which I found, after the insects had deserted it, very abundant but local on the leaflets of the Pignut Hickory (*C. glabra*) in July, and which is thought by Osten Sacken, to whom I communicated specimens, to be manifestly Aphidian; in all four galls. But besides the above four Aphidian galls, *Carya* possesses at least two Coccidous galls, namely, *caryævenæ* Fitch, which I find exclusively on the Shell-bark Hickory in August, and which is described by Fitch as Aphidian, and doubtfully referred to the genus *Pemphigus*, and *Caryæ semen* Walsh MS., a gall of the size and shape of a cabbage-seed, which I find in prodigious numbers on the leaflets of the Pignut Hickory in July.\* *Vitis* (Grape) also bears at least one gall produced by *Coccidæ*, namely, *vitifoliæ* Fitch, which I find very abundantly in July, August and September, on a species of wild grape, *V. cordifolia*, and also on the cultivated variety of that species known as the Clinton grape, and in much smaller numbers on the cultivated Delaware grape, but not on any cultivated varieties of other species of wild grape, even when they grow promiscuously intertwined with Clin-

in the two discoidal veins of the front wing uniting in a fork, instead of being perfectly separated. I propose for it the name of *Xerophylla*, which is composed of the same Greek elements as *Phylloxera*, but is rather better Greek. According to Amyot as quoted by Fitch, (*N. Y. Rep.* II, § 166), the European *Phylloxera* differs also very remarkably from our *Xerophylla*, and from all other known Aphidians, by having no subcostal vein at all; but this, as Fitch suggests, is probably an error. Respecting our generic form Osten Sacken has remarked as follows:—"It does not answer to the characters of any of the genera mentioned in Ratzeburg or Kaltenbach; (Koch I do not possess.) The antennæ are apparently 4-jointed: the 3rd joint occupies the greater part of the antenna; the last joint is very short and ends in two small bristles as in *Psylla*. Wings almost like those of *Phylloxera*, but the two first oblique veins unite in a distinct fork." (*Stettin Entom. Zeitung*, 1861, p. 421.) Fitch, by the way, observes, in the passage referred to above, that "none of the figures in Koch's works correspond with these insects, and the genus to which they pertain is evidently unknown to him." But in Koch's book, as Baron Osten Sacken informs me, the genus *Phylloxera* occurs in the list of genera at the beginning, though it is neither described nor figured, in consequence of the work having been published from the author's unfinished papers.

\*That these two galls are Coccidous, not Aphidian, may be inferred from the fact, that the tarsi of the mother-lice are 1-jointed, not 2-jointed. And besides, Dr. Fitch himself describes the mother-lice of *caryævenæ* as laying eggs, and the same remark applies to those of *Caryæ semen*; whereas all true gall-making Aphidians that are known to me are viviparous so long as they live in the gall. Moreover, all gall-making Aphidians that are known to me remain in the gall, till they have reached maturity and most of them acquired wings; whereas in these two galls the young larvæ, almost as soon as they have hatch-



ton vines swarming with these galls.\* *Amorpha* (False indigo) has one gall, produced by a small moth (Lepidoptera) belonging to a new genus which bears my unworthy name—*Walshia amorphella* Clemens.† *Salix* (Willow) has seven galls produced by Sawflies (Hymenoptera), namely, one bud-gall and three twig-galls produced by *Euura*, and three leaf-galls produced by *Nematus*, all described for the first time in this Paper. *Rosa* (Rose) has six, produced by the Hymenopterous genus *Rhodites* (Cynipidæ). *Rubus* (Bramble) has two, produced by *Diastrophus* (Cynipidæ). And finally *Quercus* (Oak) has no less than fifty-eight galls, according to Osten Sacken's latest revision, produced by *Cynips* and its subgenera; and I am myself acquainted with numerous others, which are at present undescribed. The sum total of all these galls, found on fourteen different genera of N. A. trees and shrubs, is 96.

On the other hand—always excepting, as before, galls made by those

ed out, stray away to found new galls, leaving the mother-lice behind them to lay from time to time fresh eggs. Again, all gall-making Aphidians that are known to me secrete a sugary dust or flocculent matter while in the gall, while these gall-making Coccidæ do no such thing. It is further remarkable that in a single *caryævenæ* gall, two, three or even four mother-lice are often found, in company with numerous eggs, or freshly hatched larvæ, or some eggs and some larvæ; whereas I do not remember ever to have found more than a single mother-louse in any single gall known to be produced by a Plant-louse.

\* Dr. Fitch supposed his *vitifolia* gall to be Aphidian, and referred the wingless female which he met with inside it in June to the genus *Pemphigus*; but it appears to be in reality Coccidous, for precisely the same reasons as in the case of the Coccidous gall *caryævenæ* found on *Carya*. What is very remarkable, the two or three winged males, obtained by Dr. Shimer of Illinois by opening many thousands of these galls, though they are described by him as having one-jointed tarsi, have four wings, (instead of the pair of wings and the pair of balancers, which are found in all described Coccidous genera,) the front wing, as I am informed by Mr. Cresson, with a subcostal and a basal discoidal vein almost precisely as in *Coccus*, but no other distinct veins, the hind wing with an obscurely defined subcostal only. Hence it becomes evident, that this insect cannot be referred to any genus of Coccidæ named and described by authors, and must become the type of a new and very aberrant genus. Although gall-making Coccidæ are unknown in Europe and hitherto in America, yet Baron Osten Sacken has kindly informed me, that in the Transactions of the Vienna Zoological and Botanical Society there is an account of various galls produced by true Coccidæ in Australia, "some of which Coccidæ are an inch long, the males producing galls of different shape from those of the females."

† I am quite sure that this gall is really produced by the moth, of which I have bred scores of specimens and am well acquainted with the larva. Stainton mentions the discovery by Grabow of a gall-producing Lepidopterous larva in Europe as of "extreme interest." (*Entom. Ann.* 1856, p. 57.) And Osten Sacken has referred to another such case in Europe. (*Proc. etc.* I, p. 369.)

cosmopolites, the Gall-gnats and the Mites—I know of no gall on Clematis (Virgin's-bower), on Fraxinus (Ash), on Betula (Birch), on Platanus (Plane-tree), on Juglans (Walnut), on Pyrus (Apple, Pear, &c.), on Crataegus (Thorn), on Prunus (Plum), on Cerasus (Cherry), on Persica (Peach), on Ribes (Currant and Gooseberry), on Syringa (Lilac), on Corylus (Hazel), on Ostrya (Hop-hornbeam), on Morus (Mulberry), on Maclura (Osage-orange), on Robinia (Locust), on Gleditschia (Honey-locust), on Cercis (Redbud), on Gymnocladus (Coffee-tree), on Tilia (Basswood), on Viburnum (Black-haw, Snowball-tree or Guelder-rose, &c.), on Lonicera (Honey-suckle), on Sambucus (Elder), on Cephalanthus (Button-bush), on Ceanothus (Red-root), on Euonymus (Burning-bush), on Ptelea (Hop-tree), on Ampelopsis (Virginia Creeper), on Xanthoxylum\* (Prickly-ash), on Acer (Maple), on Negundo (Box-elder), or on Juniperus (Juniper).† I have enumerated here only those N. A. genera of Trees and Shrubs, with one or more species of which I am familiar—which I have diligently searched for galls—and in which, if galls existed on the species known to me other than Acaridous and Cecidomyidous galls, I think I should have found them, at all events in the great majority of cases. But even these genera foot up to 33.

As illustrative of the comparatively general distribution of Acaridous and Cecidomyidous galls, it may be worth while to give the following abstract of their occurrence, so far as known to me, among the genera of the above two lists.—In the first list, Celtis bears 5 Cecidomyidous galls belonging to new and undescribed species. Ulmus bears 3 Acaridous galls n. sp. Populus bears 1 Acaridous gall n. sp. Pinus bears

\* Commonly, but incorrectly, spelt Zanthoxylum, though Dr. Gray in his Manual gives the correct derivation from the Greek. Evidently the botanist Colden mistook here a ζ for a ς, just as the entomologist Fitch, when he composed his Cynipidous new genus *Philonix* (properly *Philonips*) mistook a ψ for a ζ. Inconsistently enough, the botanical genus *Xanthium*, which is derived from the very same Greek root, is always spelt with an X and never with a Z.

† The Red Cedar belongs to this genus, but I have shown in the *Practical Entomologist*, (I, pp. 49—51), that certain gall-like bodies which are attached by a very short peduncle to its twigs, are not Galls, but a congeries of Epiphytous Funguses. On April 8 these reddish-brown sub-globular bodies, which average  $\frac{1}{4}$ — $\frac{1}{2}$  inch in diameter, had on their surface many circular depressions, often with a very flat central nipple, the specimens then cut into being whitish and fleshy inside, but not juicy. On April 28 filaments about  $\frac{1}{4}$  inch long and five times as long as wide, of a cylindrical shape and but slightly tapered at tip, had shot forth from these circular depressions, and were then covered with ferruginous dust, supposed to be the spores. On May 15 these filaments were  $\frac{1}{4}$  inch long, and seven or eight times as long as wide; but already some had fallen off,

2 Cecidomyioid galls described by Osten Sacken. Cornus bears 2 Cecidomyioid galls n. sp. Carya bears 8 Cecidomyioid galls described by Osten Sacken and no less than 13 n. sp., besides 1 n. sp. which is apparently Acaridous. Vitis bears 2 Cecidomyioid galls described by Osten Sacken and 2 n. sp. Salix, as has been shown in this Paper, bears 13 Cecidomyioid galls (Nos. 1—13), and at least 2 Acaridous galls (Nos. 14 and 15) and probably several others. Rubus bears 1 Cecidomyioid gall described by Osten Sacken. And Quercus bears 4 Cecidomyioid galls described by Osten Sacken, 1 described by mistake by myself as Cynipidous, (*Q. pilulæ*), and 3 n. sp., besides many Acaridous semi-galls or mere woolly indented deformations of the leaf. —In the second list, Fraxinus bears 1 Cecidomyioid gall described by Osten Sacken, and 2 Acaridous galls n. sp. Betula bears 1 Acaridous gall n. sp.; being that referred to above (*Proc. &c.* III, p. 608) as apparently Cecidomyioid. Juglans (two species) bears 2 Acaridous galls n. sp., but not a single Cecidomyioid one, although the closely allied Carya (two species) bears as many as 21 of them. Pyrus bears 1 Cecidomyioid (?) gall n. sp. Cratægus bears 4 Cecidomyioid galls n. sp. and 1 Acaridous gall n. sp. Prunus and Cerasus bear each 1 Acaridous gall n. sp. Corylus bears 1 Cecidomyioid gall n. sp. Robinia bears 2 Cecidomyioid galls described respectively by Haldeman and Fitch. Gleditschia bears 1 Cecidomyioid gall described by Osten Sacken. Tilia bears 3 Cecidomyioid galls n. sp., one of the three of doubtful origin, and 1 Acaridous gall n. sp. Cephalanthus bears 1 Acaridous gall, being that referred to above, (*Proc. &c.*

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leaving certain depressed round scars, which may always be seen on all the old dry specimens of last year's growth that still adhere to the twigs. These last may always up to this time be readily distinguished, by their being internally ferruginous, and of a hard, spongy, subligneous texture. Finally, by May 20 the apical  $\frac{1}{2}$  of the filaments had withered up and shed its ferruginous spores, shortly after which they all fell off and disappeared entirely. It is to these funguses that, I suppose, Dr. Fitch alludes, when he speaks of "rounded galls on the leaves and twigs" of the Red Cedar in New York, which he infers to be produced by Gall-flies (*Cynipidae*). (See *N. Y. Rep.* II, § 285.) I find that in Kansas, and probably elsewhere, they are popularly known as "Cedar-apples." It is remarkable that in Europe, according to Fries and Berkley, the "savin-tree, (juniperus)," by which I understand our common Red Cedar to be intended, bears similar "cedar-apples" having "long orange-colored spurs formed by the spores." (*Flagg on Fungi in Missouri Agr. Rep.* 1865, append. p. 186.) It is said also by the same authors to be "attacked by a peculiar gum (podisoma), which bursts from its bark and swells under the influence of moisture to a gelatinous mass." I have repeatedly noticed the same phenomenon on our Red Cedar in the United States.

III, p. 608,) as apparently Cecidomyidous. *Ampelopsis* bears 1 gall, evidently from its structure Cecidomyidous. *Acer* bears 1 Cecidomyidous gall described by Osten Sacken and 1 n. sp., besides 2 Acaridous galls n. sp. And lastly *Negundo* bears 1 Acaridous gall n. sp. The sum total of Cecidomyidous galls is 56 in the first list on eight genera of plants and 16 in the second list on nine genera of plants, including two galls of doubtful origin; total 72 galls, occurring on seventeen different genera of woody plants. The sum total of Acaridous galls, excluding some mere deformations, is 7 in the first list on four genera of plants, inclusive of one gall of doubtful origin, and 13 in the second list occurring on ten genera of plants; total 20 galls, occurring on fourteen different genera of woody plants. Grand total 92 galls, occurring on twenty-five different genera of woody plants, six out of the twenty-five bearing both kinds of galls.

Now look at these statistics, to see if they will teach us anything. On the one hand we have 14 genera of woody plants producing fully 96 galls other than Acaridous and Cecidomyidous galls; and on the other hand we have no less than 33 genera of the same group of plants, which on the most diligent search I have not found to produce any such galls; and which, so far as I am aware, have not been recorded by North American authors as producing them. Why should this be so? Why should 96 galls be distributed so unequally among 47 genera of the same group of plants, that 33 out of the 47, or more than two-thirds of the whole number, have none at all, and a single genus, *Quercus*, monopolizes more than one-half of the whole number? We cannot say that all these 33 genera are naturally incapable of producing galls; for at least 15 of the 33, and probably more, produce either Acaridous or Cecidomyidous galls or both. Why, then, do they not produce other galls as well? Why, as a general rule, is each gall-making genus of true insects, with the exception of *Cecidomyia* and its subgenera, restricted to a single genus of plants? Why do so many species of the same genus often occur on the same genus of plants—58 N. A. species of *Cynips*, for example, on the single genus *Quercus*, besides many undescribed N. A. species, and besides the 100 species of *Cynips* that infest the genus *Quercus* in Europe? On the Creative Theory, all this is an inexplicable mystery. On the Derivative Theory, we see at once why it should be so. For if our modern species were genetically derived from pre-existing species, several new species being generated from one old one, and whole groups from time to time becoming extinct, the actual state of facts, as it has been presented above, is pre-

cisely that which we should, reasoning *a priori*, expect to meet with. Surely, therefore, upon general principles, a hypothesis, which accounts clearly and satisfactorily for a great mass of phenomena, is more likely to be a correct one, than a hypothesis which accounts for nothing, and, while it mercifully spares our Reasoning powers, draws most largely and exorbitantly upon our Faith.

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And now, in conclusion, it is but fair dealing towards the American reader, as in the former part of this Paper I expressed considerable skepticism in regard to Wagner's supposed discovery of viviparous larvæ, (pp. 571—4 and 641—4,) to take this opportunity of stating, that I am informed by Baron Osten Sacken that Wagner's facts have been verified by the German entomologist Gerstaecker and that they are generally believed in Germany; and that Mr. Darwin writes me word that they are believed by the distinguished English naturalist, Sir J. Lubbock. It further appears, from what Baron Osten Sacken tells me, that the prolific *Cecidomyioides* larvæ, instead of belonging to the genus *Cecidomyia*, as I had been originally led to suppose, (*Proc. &c.* III, pp. 571—2,) are now ascertained to belong in reality to a rather anomalous genus, which has been named *Miastor*, and which "has been found to be almost identical with *Heteropeza* Winnertz." Respecting this last genus Loew observes, that "it seems to harmonize in many points with the genera of the first section, [which includes *Cecidomyia*.] but differs very strikingly by the totally different structure of its tarsi." (*Dipt. N. A.* p. 7.) Hence the principal stumbling-block which lay in my path—namely, that different species, belonging to one and the same genus *Cecidomyia*, should have such essentially different and heterogeneous habits—is removed at once; and I beg leave hereby to recant and disavow my former skepticism as to Wagner's very remarkable and important discovery.

Rock Island, ILL., August 31, 1866.

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#### ERRATA.

Page 237, line 4 from bottom, for "*Pristophora*" read "*Pristiphora*."

Page 268, lines 24—5, for "scutlelatus" read "scutellatus."

**NOTES ON THE HABITS OF A FEW CALIFORNIA COLEOPTERA.**

BY GEO. H. HORN., M. D.

AMPHIZOA INSOLENS Lec.

The knowledge of the habits of this insect has long been a desideratum to science. The locality from which it was obtained was not even known. The specimens from which the original description was made was obtained by Dr. LeConte from Mr. Rathvon, of Lancaster, Pa., from whom no information could be obtained, except that they came from California. The first specimen sent me was from Fort Klamath, Oregon, immature and in a damaged condition. Shortly after receiving this, I went to North-eastern California, near the head waters of Pit river—a tributary of the upper Sacramento. Near Fort Crook I saw the first living specimens, though so rare and difficult to be obtained, that I was satisfied with the securing of a few specimens, without risking the loss of any in the observation of their habits. From Fort Crook I went to Surprise Valley, on the boundary line between California and Nevada. Here I found them very abundant, as well as on the western slope of the Sierras, in the creeks forming the three head branches of Pit River.

*Amphizoa* is as essentially sub-aquatic in its habits as any of the Parhidæ, which it closely resembles in its terrestrial and sub-aquatic motions. They occur more abundantly in stony creeks, and preferably on stones of which some portion projects from the water. This enables them to come to the surface for fresh air without detaching themselves. They live in herds, so to speak. I have found eight or ten crowded closely together, adhering to one small stone. Living in swift currents, they naturally adhere to rough stones. I have found many, however, adhering to the under side of grass sods which project from the shore into the stream.

When placed on land, they run with moderate rapidity, though rather clumsily. They are very poor swimmers, being scarcely able to make any progress, even when thrown upon still water. The lightness of their bodies keeps them from sinking, and they can only take position under water by lodging against a stone or root, and walking under. When under water, they move with much greater ease than on land, the peculiar shape of their bodies affording but little resistance even to strong currents.

When caught, they exude a greenish, milky juice, having the odor of decaying wood.

The sexes can be readily distinguished from each other. The male being narrower, and more convex.

*Amphizoa* resembles, to a marked extent, the genus *Nyctopetus* of the Tenebrionidæ, so much so, that, without a close examination, it has been pronounced a member of that genus.

Some discussion has arisen regarding the relationships of this curious insect. Specimens recently sent by me to Paris will undoubtedly elicit more discussion, and the proper status given the insect in relation to families already recognized. Occurs during July and August.

#### METRIUS CONTRACTUS Esch.

This insect occurs under stones in shady places, or in woods at a considerable elevation. I have specimens from the Coast range, north and south, from Tejon, and from the high Sierras near the head waters of King's and Kern rivers. *Promecognathus* is found like *Metrius*, but appears to be confined to the Coast range.

#### PSYDRUS PICEUS Lec.

Occurs at Fort Crook, California, under pine bark. They emit from the anus, with a slight explosion, a liquid similar to that emitted by the Brachini. I noticed no offensive smell connected with it. The Cychri of California have a similar habit. Their liquid is, however, emitted without explosion, and is very irritating to the eyes should any of it, by accident, come in contact with them.

#### ANCHOMMA COSTATUM Lec.

This insect, until my return from California, remained represented by an unique in the Cabinet of Dr. LeConte. It is found abundantly in Owens Valley under stones, and particularly those under which ants are living. They live in colonies, as many as fifty or even one hundred having been found by myself in a single colony. Specimens have occurred also at Tejon, San Felipe and San Diego. It occurs at all seasons of the year.

#### NISODES SERRATA Lec.

Is found rather commonly in the mountainous regions of north-eastern California. It may be found in the flat, cottony fungi growing between the bark and wood on old pine stumps. With it may be found *Peltis Pippingskældi* Mann. and *P. fraterna* Randall.

#### GYASCUTUS OBLITERATUS Lec.

From a letter lately received from Dr. Cronkhite, I learn that this

insect occurs rather abundantly during the summer, on the low willows that are so plentiful in Owens Valley. I did not find the insect while in this section.

AUCHMOBIUS INFAUSTUS Lec.

This rare insect, of which the type has for years been lost, has occurred in my collection from Tejon, and may possibly be found in those from Owens Valley. It occurs in early spring under stones and fallen logs, with *Eurymetopon* and *Coniontis*. The Tenebrionidæ of California can be better collected during the early spring; and to such as have the opportunity, I would strongly urge attention to that part of the year immediately succeeding the rainy season, while the ground is still moist. At this period, all the insects appear to be more abundant. Many of the Tenebrionidæ live during several seasons, and these, together with the new brood, appear as before indicated. Though no specimens of *Craniotus* and *Auchmobius* were in Dr. LeConte's Cabinet at the time of the preparation of his classification of the Tenebrionidæ of North America, the positions assigned these genera are undoubtedly correct, and they may be readily recognized by the characters given.

CRANIOTUS PUBESCENS Lec.

Dead specimens of this rare insect were found at Vallecito. Living specimens occurred on the Maricopa desert, under dead stems of *Cereus giganteus*, in the months of March and November.

DACODERUS STRIATICEPS Lec.

This insect and *Aræoschizus costipennis* Lec. may be found in small colonies, under stones in very dry places during March and April. The specimens of *Dacoderus*, found by Dr. LeConte at Fort Yuma, occurred under Cottonwood bark. This was evidently an accidental occurrence, as I found a pair under my medicine chest while camped at the same place. *Dacoderus* and *Aræoschizus* have, evidently, the habits of the Stenosiini of South America, of which Lacordaire says, "they live in small colonies under stones, and are, in their movements, moderately agile." This latter is not the case with our species. Though I have seen probably a dozen of each, I have never been able to make them walk; they feign death. A new species of *Aræoschizus*? occurred very abundantly in Owens Valley, California, under stones, generally with ants; this moves very slowly, and carries its antennæ directly in front and parallel to each other.



## APOCRYPHA ANTHICOIDES Esch.

Occurs under chips, etc., in very dry places. It is difficult of capture as it is exceedingly agile in its movements. It occurs at Tejon during April and May.

The *Eleodes* of California, more especially the elongate forms, *dentipes*, *gracilis*, *longicollis*, *grandicollis*, etc., have the habit, if disturbed while walking, of elevating the hinder portion of the body so as to make them stand almost vertically. In this position they will remain sometimes for hours. If handled they emit an offensive, oily liquid from the anus, staining the hands, of a somewhat reddish color, becoming brown on the attempt to remove it with soap.

## CONONOTUS SERICANS Lec.

Adheres to the under side of stones. Occurs in very dry places and is more abundant in early Spring. They are generally in colonies, and have their heads all in one direction. They move almost as rapidly in hot weather as *Telephanus velox*. To secure a whole colony the head one must be taken first, for if one be disturbed and runs forward among the others, all start.

## CYSTEODEMUS ARMATUS Lec.

Very abundant during March and April. I have found it ranging over an extent of country equal to nearly three hundred miles, from the great bend of the Gila to Vallecito, California. During life this insect is covered with a whitish efflorescence, forming a band suggestive of the marking on the elytron of *Megetra*. This insect also lives on the Greasewood bush, a fact reported also by Dr. LeConte, in the original description of the insect. It is rather remarkable, that of an insect of which millions could be collected in season, so few remains are found in the fall.

## TEGRODERA EROSA Lec.

Occurs rather abundantly in Owens Valley during the latter part of June, on a low plant bearing a blue flower. Though winged, I have never seen it fly. This insect was described from specimens brought from San Diego. It is a remarkable fact that many of the species previously reported from San Diego, and even from Arizona and New Mexico, have been sent me from Owens Valley since my departure from it.

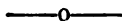
The numerous species of vesicants (*Lytta*, *Epicauta*, etc.) of California are found infesting the various species of Lupin, (*Astragalus*), so common all over the State. *Lytta vulnerata*, however, occurred on Composite plants only.

## . PHODAGA ALTICEPS Lec.

This insect has also been reported from Owens Valley. Never having found it there I do not know its habits in that particular region. While travelling through Arizona I found specimens in the neighborhood of Greasewood or Creosote bush (*Larrea mexicana*). It flies but feebly, appearing rather to sustain itself in the air and to be blown about by the wind, than to make any actual progression by its own flight. Occurs in March and April.

## ULCHÆTES LEONINUS Lec.

This insect makes its first appearance during the latter part of July. I found a specimen at Fort Crook, under pine bark, and also a pupa which I was unable to bring to maturity. It is not rare.

On *USECHUS LACERTA* Motsch.

BY GEO. H. HORN, M. D.

This insect was originally described by Motschulsky, in Bulletin Moscow, 1845, I, p. 79, and has remained unknown to American entomologists until very recently. A few years since Motschulsky (*Études Entomologiques*, Ann. V, p. 22) made the statement that *Usechus lacerta* was identical with *Rhagoderma tuberculata* Mann. This mistake could have occurred only by a confusion of types, as the original description of Mannerheim could not be applied to the insect as figured by Motschulsky. The one is a Colydiide and the other a Tenebrionide. The object of the present paper is to establish the relationships of *Usechus*, as Motschulsky omits all mention of the position it should occupy in a systematic arrangement.

A single specimen of this rare insect is in my collection. For it I am indebted to Dr. J. G. Cooper, by whom it was collected near Santa Cruz, California. It probably occurs under the bark on oak stumps.

The figure given by Motschulsky of this insect, though badly executed, serves to give an idea of its general appearance.

The hind margins of the ventral segments are all corneous, and the middle coxæ are squarely closed externally, not allowing the trochanters to become visible. These characters seem to fix its position as a member of the Sub-family of Tentyriidæ.

The apex of the ligula is visible beyond the mentum, which is rhomboidal, with the anterior angles broadly rounded. The bases of the

maxillæ are exposed. The gular peduncle distinct. Epistoma scarcely emarginate; apex of labrum alone visible. Head immersed in thorax as far as the eyes, which are round and very coarsely granulated as in the *Stenosiini*, not narrowed behind the eyes. Thorax truncate anteriorly, with deep antennal grooves extending from the anterior angles to nearly the middle of the lateral margin. Coxæ widely separated. Tarsi not sulcate beneath. Antennæ 11-jointed, joints distinct, the last three broader. The pores of the antennæ occupy spongy patches at the anterior distal angles of the ninth and tenth, and a similar position on the last joint, though extending towards the apex.

The above assemblage of characters, though pointing to affinities with the *Zopherini*, require the formation of a separate tribe for the reception of this genus. The name *USECHINI* is, therefore, proposed for the tribe, the position of which is undoubtedly near the *ZOPHERINI*, from which it may be readily distinguished by the rounded and coarsely granulated eyes. To enable this tribe to occupy its proper position, the following modification of the table of tribes, as given by Dr. LeConte, (*Class. Coleop. N. A.*) is proposed :

Tibial spurs very minute.

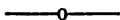
Anterior coxæ widely separated.

Eyes transverse, finely granulated.....*Zopherini*.

Eyes rounded, coarsely granulated.....*Usechini*.

Anterior coxæ narrowly separated; antennæ 11-jointed.....*Stenosiini*.

Anterior coxæ contiguous; antennæ 10-jointed.....*Dacoderini*.



#### On *RHAGODERA TUBERCULATA*, Mann.

BY GEO. H. HORN, M. D.

Having in the preceding paper made mention of the confusion of two distinct insects, members of different families, I have thought it of importance to entomological science to give more at length than has been done in American publications, a description of this genus and species, and briefly describe a new one from Arizona. The first notice of this genus occurs in the second Catalogue of Dejean. Erichson in his *Insecten Deutschlands*, III, p. 255, makes short mention of it, while Mannerheim (*Bull. Mosc.* 1843, p. 300,) gives a short description of the species.

*Generic characters*.—Mentum transversely quadrate, rounded in front. Ligula rounded anteriorly, scarcely visible beyond the mentum. Lateral processes of the gula exceeding the mentum, moderately broad.

Palpi short, last joint of labial oval, acuminate; Maxillary oval, truncate. Epistoma truncate. Labrum transverse, scarcely visible. Head quadrate, lobed over the insertion of the antennæ, with supra-ocular ridge; narrowed behind into a neck. Antennæ 11-jointed, moderately robust, one-half longer than the head; first and third joints cylindrical, the others broadly conical, gradually becoming broader; last joint smaller than the 10th, rounded and free. Antennæ, in repose, received for part of their length, in deep sub-ocular grooves. Eyes round, very prominent and very coarsely granulated. Prothorax as broad as the elytra, moderately convex, with two acute ridges above, emarginate in front, lobed at middle of emargination, the lobe itself being acutely emarginate between the ends of the thoracic ridges; base with a broad median lobe, emarginate near the angles, sides moderately rounded, serrulate, beneath with a vague impression for the reception of the antennæ. Scutellum invisible. Elytra oblong, parallel, moderately convex, base emarginate at middle. Legs moderate; tibiæ slender, without terminal spines. Segments of abdomen separated by straight sutures, not emarginate, the 1—4 inclusive with a fovea on each side.

***R. tuberculata*.**—Blackish-brown, moderately elongate and convex. Head quadrate, coarsely punctured, with lateral impressions, superciliary ridge acutely elevated above the eye. Thorax broader than long, sides moderately rounded, slightly denticulated, posterior angles rectangular. Elytra oblong, moderately convex, rounded at apex, base emarginate at middle, with nine costæ, including the sutural and marginal. The first costa entire, the second and third abbreviated; interspaces with two rows of coarse, deep punctures. Beneath coarsely punctured. Length .30—.32 inch.

This insect has been found along the west coast of North America, from Sitkha (Eschscholtz) to San Diego (LeConte), my own specimens being from intermediate points in the Coast range of California, where it does not appear to be very rare.

***R. costata* n. sp.**

This differs from the preceding by its somewhat greater size, more depressed form, and greater prominence of all the costæ and deeper interstitial punctures. The superciliary ridge is not acutely elevated above the eyes. The thorax is more strongly rounded and obliquely narrowed behind; the posterior angles acute and produced backward. The humeral angles of the elytra are rectangular. Length .38 inch.

I found this species in Arizona, near Gila bend station, under a fallen branch of Mesquit.

The authors who have written concerning the Colydiidæ, make the

statement that the posterior coxæ are contiguous in two of the tribes, (Synchitini and Colydiini). The intercoxal process of the abdomen is well marked, and though not so broad as in Bothriderini, etc., yet separates very plainly the posterior coxæ.

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**Some observations on PHODAGA ALTICEPS, Lec.**

BY GEO. H. HORN, M. D.

With the exception of *Eupompha fissiceps* Lec., there is no vesicant in our territories presenting so many curious characters. Between the male and female of *Phodaga* great differences exist, in the form of the legs and tarsi; the object of the present notice being to give these in detail, as no perfect male has ever been in collections until brought by myself from the deserts of Arizona. Recently specimens have been sent me from Owens Valley, California, by Dr. H. M. Cronkhite, to whom I must acknowledge great indebtedness for liberality, and who recognized the insect, though I failed to find it during a year's residence in that region.

*Male*.—Head sinuous behind. Vertex elevated. Front channelled longitudinally with two prominent tubercles between the eyes and above insertion of the antennæ. Epistoma concave. Antennæ short, eleven-jointed, first joint longer, second joint very small. Mandibles toothed at tip, deeply grooved on outer face. Anterior tibiæ flattened, sericeous on the inner face, densely pilose externally, especially toward the apex; tarsi very much compressed, first joint much larger, contorted, and produced obliquely inward; spinous beneath; claws deeply cleft, slender, and yellowish in color. Middle legs flattened; femora thicker at base; tibiæ dilated and deeply longitudinally excavated on the inner face; tarsi compressed, longer than the tibiæ, first joint equalling second and third together. Posterior legs longer, tibiæ and femora slightly arcuate; tarsi compressed, first joint nearly equal to the three succeeding joints; tibial spurs long, slender and acute.

*Female*.—Excepting the particulars indicated above in italics there is no difference between the sexes. The anterior tarsi are simple, the middle tibiæ not dilated. The frontal tubercles are not present.



1. Front of male.
2. Profile of male.
3. Anterior tibia and tarsus.
4. Middle tibia.
5. Claw.

## NOTES ON THE ZYGENIDÆ OF CUBA.

BY AUG. R. GROTE.

Curator of Entomology, Buffalo Society of Natural Sciences.

## PART II.—With a Supplement.

## ISANTHRENE, Hübner.

*Isanthrene chalciope.**Isanthrene chalciope*, Hübner, Zutr. 3rd Hund. p. 20, No. 235, figs. 469—470. (1825.)*Glaucopsis (Isanthrene) chalciope*, Walker, C. B. M. Part I, p. 155. (1854.)*Glaucopsis chalciope*, Lucas, Hist. Nat. Cub. p. 663. (1857.)*Glaucopsis chalciope*, Herrich-Schaeffer, Corr. Bl. Reg. No. 8, p. 114. (August, 1866.)

Two specimens.

*Habitat.*—Cuba, (Poey.) Coll Ent. Soc. Phil.Number 136, *Poey's MS. Catalogue.*

## HIPPOLA, Walker.

“*Hippola syntomoides.*”*Glaucopsis syntomoides*, Boisd. Sp. Gen. Lep. Vol. I, Pl. 16, f. 4. (1836.)*Euchromla (Hippola) syntomoides*, Walk., C. B. M. Lep. Pt. 1, p. 227. (1854.)*Glaucopsis syntomoides*, Lucas, Hist. Nat. Cub. p. 659. (1857.)*Glaucopsis syntomoides*, Herrich-Schaeffer, Corr. Bl. No 8, p. 114. (August, 1866.)

The specimens do not agree well with Boisduval's figure, and the species has been nowhere described to my knowledge. Since Prof. Poey in his MS. Catalogue and Dr. Herrich-Schaeffer in the Corr. Blatt, both give the specific determination without doubt or remarks, I give it, provisionally, under the generic name proposed, by Mr. Walker in the British Museum Lists, for a number of dull cyaneous, albo-maculate Glaucopidians, which, though perhaps separable into distinct genera, may remain temporarily united by their coloration.

The specimens (♂ and ♀) sent by Prof. Poey, differ from Boisduval's figure of “*Glaucopsis syntomoides*,” which apparently represents a male, as follows:—The wings are narrower and distinctly dotted with white at base. There is no white dot on the median vein at the middle of the wing as represented by Boisduval's figure. The white maculations are not so broad and prominent in the Cuban specimens and differ in slight details. In Boisduval's figure, the white at the base of the abdomen is carried entirely and evenly across as a broad band, whereas in the Cuban specimens, the white color is limited to the lateral glandular pouches, there being but a narrow line of white scales

edging the basal abdominal segment, inferiorly, above. Finally, the abdomen is spotted with white laterally in the Cuban specimens, and the antennæ are curved towards their tips, but the first character is scarcely discernible from above, and the last may have been unnaturally changed by the French artist for the reason, perhaps, that these were thought to look better straight or slightly and methodically curved than with the twists given them by Nature.

Perhaps it is hardly worth while considering whether a discordant figure, to which no description is appended, does or does not represent a certain insect, but I leave it to the Cuban Entomologists to decide the matter, and to retain or reject a specific name which rests on no safe foundation.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

*Number* 298, *Poey's MS. Catalogue*.

In the structure of the corporal parts, "*Hippola syntomoides*" is closely allied to Hübner's *Isanthrene chalciope*.

***Hippola minima***, n. s. (Plate 5, fig. 6, ♂).

Size, small. Dull blackish, with a bright cyaneous shade which is very prominent on the abdomen above.

Primaries narrow, produced at apices; external margin very oblique, slightly rounded superiorly. A few white scales at base. At the middle of the wing, a white subquadrate spot below median nervure. A larger white spot at the base of the median nervules, filling the interspaces opposite the discal cell. Above and within this latter spot, and obliquely placed with regard to it, is a smaller one below costa. Secondaries, narrow, slightly rounded below apices, resembling primaries; an elongate white spot at base, subparallel with costa; beyond, an ovate, obliquely placed, similar spot, at about apical third.

Under surface of both pair, same as upper surface.

Head, well extended; eyes prominent. Palpi, slight, with a few whitish scales beneath; "front," blackish cyaneous.

Antennæ, moderate, not curved or twisted terminally, finely and evenly pectinate. The upper surface of the antennal stem is covered with brownish cyaneous scales, the under surface and pectinations are brown, with the last ones of quite a pale, somewhat yellowish shade. "Collar," blackish centrally, with very prominent white lateral spots. Tegulæ and thorax, blackish cyaneous, with white, lateral scale patches.

Abdomen, cyaneous, with two large, lateral, white maculations over the basal pouches. Laterally, the segments are spotted with white.

Legs, blackish cyaneous; hind tarsi fringed with longer concolorous hair, which extends above on the base of the tibiæ, these latter well developed. Exp. ♂, 0.95 inch. Length of body, 0.40 inch.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 594, Poey's MS. Catalogue.

This species is very much smaller than the preceding, and I consider it generically distinct, but it resembles it closely in ornamentation, and it would naturally be referred to *Hippola* in the present state of our knowledge of these interesting insects.

#### EMPYREUMA, Hübner.

##### *Empyreuma pugione*.

*Empyreuma pugione*, Hübner, Zutr. 1 Hund. p. 12, No. 21, figs. 41—42. (1818.)

*Empyreuma lichas*, H-S., Corr. Blatt, No. 8 p. 115. (August, 1866.)

I purposely avoid giving further synonymy, owing to the fact that, while I see there are two closely allied species of *Empyreuma*, I have only one before me which I regard as intended by Hübner as above cited.

The Latin diagnosis given by Mr. Walker to "*Euchromia pugione*," C. B. M. Lep. Het. Part 1, p. 211, 1854, agrees better with the Cuban specimens than that of "*Euchromia lichas*," yet to this latter a specimen from Cuba is cited. The antennal tips in the Cuban specimens are brownish fulvous, ("antennæ apice fulvæ," Walk.) a character not indicated by Hübner, whose specimens came from St. Thomas; otherwise my specimens agree too nearly for me to doubt this determination. Mr. Walker has evidently separated two species and afterwards (C. B. M. Lep. Het. Part 7, p. 1622) gives the additional habitat of "Jamaica" for specimens of "*Empyreuma pugione*, Walk.," although at first giving only "South America" for "*Euchromia pugione*, Walk.," with the Latin diagnosis of which species my Cuban specimens agree. Herrich-Schaeffer determines the Cuban species as "*Empyreuma lichas*, Cramer," while Cramer's miserable figure (Pl. 45, f. B.) is quite useless in the matter of closely allied species; the specific name of *lichas*, is first used by Cramer for a species from St. Thomas. Fabricius gives Cramer's *Sphinx lichas*, as a synonym of *Zygæna pugione*, Fabr., (*Sphinx pugione*, Linn. Syst. Nat. 2, 807, 45) and his diagnosis (Sp. Ins. Vol. II, p. 163, No. 33) agrees entirely with the Cuban specimens. Fabricius afterwards separates two species in his "Mantissa," giving no authority for his *Zygæna lichas*, Fabr., (p. 104, No. 34) a name which is now used for a species which is not Cramer's *Sphinx lichas*, 45, B, but is, from the similarity of the diagnosis, *Euchromia lichas*, Walk. I am led to conjecture that Mr.



Walker's citations of *Empyreuma pugione*, *Hübner*, should be transferred to "*Euchromia pugione*," *Walk*; the two species will then be *Empyreuma lichas*, *Hübner*, (*Zygæna lichas*, *Fabr.*, (nec. *Cram.*) *Mant.* p. 104, 34,) and *Empyreuma pugione*, *Hübner*, (*Sphinx pugione*, *Linn.*, *Syst. Nat.*; *Zygæna pugione*, *Fabr.*, *Sp. Ins.* Vol. II, 163, 33; *Mant.* Vol. II, p. 105; *Sphinx lichas*, *Cramer*, *Pl.* 45, f. B.,) as which latter species I determine the Cuban specimens I have before me. The habitat of Mr. Walker's specimens of "*E. lichas*," will need confirmation, as it does not seem probable that the first species ("abdomen atrum, cingulis duabus aureis" and "alæ rufæ striga media viridi punctoque albo") is also Cuban.\*

This genus is closely allied to the European *Zygæna*, *Fabr.*, and assists our comprehension of the homogeneity of the family *Zygænidæ* as here considered.

\* I note here an erroneous determination of Mr. Walker's in the genus *Anisota*, *Hübner* (*Dryocampa*, *Harris*).

Dr. Harris (*Ins. Inj. Veg.*) has described our United States *Anisota rubicunda*, *Grote*, (*Dryocampa rubicunda*, *Packard*) as *Dryocampa rubicunda*, taking the specific name from *Fabricius' Bombyx rubicunda*. This is evidently correct, our insect agreeing with *Fabricius' diagnosis*, which reads as follows:—

"69. B. alis reversis: anticis roseis; fascia lata flava.

Habitat in Virginia. Mus. Dom. Bosc.

Magnitudo B. populi. Antennæ pectinatæ, flavæ, apice nudæ. Corpus villosum, flavum. Alæ anticæ roseæ fascia flava, quæ imprimis ad costam extenditur. Posticæ flavescentes umbra tantum rosea. Pedes rosei." *Ent. Syst.* Vol. III, p. 429, (1793.)

This species is described by Mr. Walker in *Supp. Cat. B. M. Lep. Het.* Part 2, (32) p. 574, (1865,) as *Dryocampa venusta*, *Walk.*, with the remark: "The rosy costal stripe of the fore wings distinguish it from *D. rubicunda*." But it is evident from *Fabricius' description*, that this very rosiness of the primaries is a character of his *B. rubicunda*, while his habitat is decisive. *Dryocampa venusta*, *Walk.*, must, therefore, be referred as synonym of *Anisota rubicunda*, while for the Brazilian representative of our species I propose the following name:—

*Anisota walkeri*, n. s.

*Dryocampa rubicunda*† *Walk.*, *C. B. M. Lep. Het.* Part 6, p. 1497. (1855.)

*Dryocampa Walkeri*, *Grote*, MS.—

"Fœm. Flava; palpi pedesque rosei; antennæ basi roseæ; alæ apud marginem roseæ.

*Female*.—Yellow. Palpi and legs mostly rose-color. Antennæ rose-color at the base. Fore wings of a delicate bright rose-color about the base and on the costa and along the exterior border. Hind wings rose-color along the costa and along the apical part of the interior border. Length of the body 7—8 lines; of the wings 22—24 lines.

*Var. β*. Hind wings with a broad, pale, marginal, rose-colored band, extending from near the tip of the costa to half the length of the interior border."

*Habitat*.—"Brazil," (*Walker*.)

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.  
 Number 155, Poey's *MS. Catalogue*.

**ECHETA, H-S.*****Echeta albipennis*.**

*Echeta albipennis*, H-S., Corr. Bl. Reg. No. 8, p. 117. (August, 1866.)

This genus reminds one of *Scepsis*, Walk. *E. albipennis*, is unusually light-colored; the primaries are whitish above, except a brownish longitudinal stripe along internal margin.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 706, Poey's *MS. Catalogue*.

***Echeta subochrea*.**

*Correbia subochrea*, H-S., Corr. Bl. Reg. No. 8, p. 115. (August, 1866.)

I have a single male specimen of this species before me with mutilated secondaries. In size it resembles *E. albipennis*, and approaches that species so nearly in the structure of the body and appendages, that I am disposed to regard the two species as congeneric.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 157, Poey's *MS. Catalogue*.

**CALONOTOS, Hübner.*****Calonotes thetis*.**

*Sphinx Thetis*, Linn., Mant. 1. 539.

*Sphinx Thetis*, Drury, Ill. Ex. Ent. Vol. I, p. 57, Pl. 26, fig. 4. (1770.)

*Zygæna Thetis*, Fabr., Sp. Ins. Vol. II, p. 160, No. 13. (1781).

*Zygæna Thetis*, Fabr., Mant. Ins. Vol. II, p. 103, No. 15. (1787).

*Sphinx Leneus*, Cramer, Exot. Vol. III, p. 95, Pl. 248, fig. G. (1782).

*Zygæna Thetis*, Fabr., Ent. Syst. Vol. III, p. 391, No. 17. (1793).

*Calonotes Thetis*, Hübner, Verz. Schm. p. 123, No. 1331. (1816).

*Zygæna? Thetis*, Westwood, Drury Ex. p. 52, Pl. 26, fig. 4. (1837).

*Euchromia Thetis*, Walker, C. B. M. Lep. Het. Part 1, p. 262. (1854).

*Glaucomis Thetis*, Lucas, in R. d. l. Sagra Hist. Cub. p. 667. (1857).

*Charidea thetis*, Herrich-Schaeffer, Corr. Bl. Reg. No. 8, p. 116. (August, 1866).

Three specimens (♂ and ♀) examined.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 167, Poey's *MS. Catalogue*.

**ACLYTIA, Hübner.*****Aclytia heber*.**

*Sphinx Heber*, Cramer, Pap. Ex. Vol. III, p. 169, Pl. 287, fig. A. (1782).

*Sphinx Halys*, Cramer, Pap. Ex. Vol. IV, p. 129, Pl. 357, fig. C. (1782).

*Aclytia Halys*, Hübner, Verz. Schm. p. 123, No. 1337. (1816).

*Aclytia Heber*, Hübner, Verz. Schm. p. 123, No. 1338. (1816).

*Euchromia Halys*, Walker, C. B. M. Lep. Het. Pt. 1, p. 243. (1854).

*Euchromia Heber*, Walker, C. B. M. Lep. Het. Pt. 1, p. 244. (1854).

*Autochloris heber*, Herrich-Schaeffer, Corr. Bl. Reg. No. 8, p. 115. (August, 1866).

Four specimens (♂ ♂ ♀ ♀) examined. Prof. Poey sends the form

figured by Cramer in his last Volume under the name of *Halys*, as the female of this species. Hübner's genus is erected for these two species of Cramer's, which Mr. Walker has introduced into different Groups of his genus "*Euchromia*," without, however, being autoptically acquainted with both forms.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 153, *Poey's MS. Catalogue*.

#### **APISTOSIA**, Hübner.

***Apistosis humeralis*, n. s.**

*Apistosis judas*† Herrich-Schæffer, (nec. Hüb. Zutr.) C. B. Reg. No. 8, p. 120, (August, 1866.)

Head, above and beneath, palpi and prothoracic parts, orange-yellow. Maxillæ, rather long, blackish. Antennæ, dull brownish, simple or nearly so. Thoracic disc, orange-yellow, of a little paler shade than the "collar" and caputal parts. Tegulæ, concolorous with the wings, discolorous with the thorax, blackish, margined and overlaid or shaded with bluish-green scintellate scales. Abdomen concolorous with the wings, dull obscure blackish or brownish, with prominent bluish-green reflections equally disposed, but less apparent on the under surface in the female. Terminally, in the male, the genital appendages and anal segments are clothed with yellow scales; beneath, the anal segment is provided with two prominent orange sub-lateral tufts of longer scales; centrally, the lateral claspers have darker, scintellate scales. In the female, the abdomen terminates acutely and a pre-anal orange-yellow band is continued entirely around, the extremity of the abdomen being blackish and scintellate. Legs, blackish, scintellate; in the male, the yellow color of the prothoracic parts beneath, extends over anterior and middle coxæ and femora.

Wings, entirely dull obscure brownish or blackish, with an evenly disposed metallic reflection, which varies from bluish to greenish according as the light falls on the wings. The primaries are more brilliant than the secondaries. Beneath, the same as above, but the reflection is hardly so prominent. Exp. ♂, 1.50, ♀, 1.80 inch. Length of body, ♂, 0.50, ♀, 0.55 inch.

*Habitat*.—Cuba, (Poey.) Coll. Ent. Soc. Phil.

Number 318, *Poey's MS. Catalogue*.

Nearly resembles the Brazilian *Apistosis judas*, Hübner, but is a slightly larger species, differing by the terminal abdominal coloration and prominently by the dark patagia, which, in Hübner's figure and as expressed by Walker's diagnosis, are concolorous with the rest of the thorax and yellow.

**URANOPHORA**, Hübner.***Uranophora chalybea*.**

*Uranophora chalybea*, Hübner, Zutr. 3tes Hund. p. 14, No. 220, figs. 439—440. (1825).

*Apistosis ? terminalis*, Walker, C. B. M. Lep. Het. Pt. 2, p. 478. (1854).

*Charidea chalybea*, Herrich-Schaeffer, Corr. Bl. Reg. No. 8, p. 116. (August, 1866).

Hübner gives "Cuba," as the habitat of his specimen. The figures of the species in the "Zutræge," seem too highly colored when compared with the specimens sent by Prof. Poey, while agreeing in the main with the representation of Hübner's species, as well as with Mr. Walker's description above cited.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 319, *Poey's MS. Catalogue*.

**CTENUCHIDIA**, Grote.***Ctenuchidia virgo*.**

*Ctenucha ? virgo*, Herrich-Schaeffer, Lep. Ex. p. 74, fig. 301. (1850—1858).

*Mevania ? subcyanea*, Walker, C. B. M. Lep. Het. Pt. 2, p. 443. (1854).

*Ctenuchidia virgo*, Grote, Notes Bombyc. Cuba, p. 1. (huj. scrip. Dec., 1865).

*Ctenuchidia virgo*, Herrich-Schaeffer, Cor. Bl. Reg. No. 9, p. 132. (September, 1866).

This genus is beautifully illustrative of the affinities of the spotted Pericopid genera with *Apistosis*, *Ctenucha* and *Uranophora*. Mr. Walker's description, above cited, appears to belong here, and is so referred by Dr. Herrich-Schaeffer. *C. virgo*, however, cannot be referred, I should think, as congeneric with *Mevania quadricolor*, Walk.; while Mr. Walker, after doubtfully referring his species to *Mevania*, adds: "this species may form a new genus." If distinct from *C. virgo*, Mr. Walker's species may be known as *Ctenuchidia subcyanea*; and this name might obtain for the present species in the case Mr. Walker's specific name prove earlier than Herrich-Schaeffer's, for, although I believe it to be later, I have no means of critically pronouncing upon the matter from the data furnished by the work of the latter author.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 154, *Poey's MS. Catalogue*.

**COMPOSIA**, Hübner.***Composia fidelissima*.**

*Composia fidelissima*, Herrich-Schaeffer, Cor. Bl. Reg. No. 9, p. 132. (September, 1866).

I have examined several specimens of this interesting and beautiful species which is regarded by Dr. Herrich-Schaeffer (l. c.) as undoubtedly congeneric with *C. credula*, Hübner, the latter a species which I

only know from Hübner's figures. The male of *C. fidelissima*, is smaller than the opposite sex, which it resembles quite closely in ornamentation; the antennæ are finely and rather shortly bi-pectinate, the pectinations becoming obsolete at the base and tapering to the tips. The dark blue color of the secondaries reminds one of *Ctenucha* and *Ctenuchidia*; the scarlet costal spots at base of primaries are shared by the following genus.

*Habitat*.—Cuba, (Poey). Coll. Ent. Soc. Phil.

*Number* 596, *Poey's MS. Catalogue.*

**SPHEROMACHIA, n. g.**

Head, small, held on a line with the body, not depressed, though but slightly advanced and improminent, owing to the very narrow, reduced, prothoracic pieces. Labial palpi rather long, finely scaled, porrect, advanced before the "front" which they exceed. Maxillæ, short and slight. Legs, weak, unarmed. All the corporal parts are finely and thinly scaled, so as to show the structure of the body crust more plainly than usual. Thorax, globose, rather short, so that, with the small head, it is hardly half the length of the abdomen. Basal abdominal segment a little constricted, the lateral glandular pouches are spherical and prominent. Abdomen, cylindrical, long, linear, not wider (♀) than thorax, evenly distended and terminating rather bluntly without anal pilosities; the segments are broader than usual.

Primaries, broad, large, triangulate; costa arched to apex which is not produced as in *Composia*, *Pericopsis*, etc., but is blunt, the external margin being extraordinarily straight, very slightly rounded at internal angle, while the internal margin is longer than usual and very straight. In shape the wing thus approaches very nearly a right-angled triangle, of which the costa would be the hypotheneuse. The first, second and third m. nervules are thrown off, at nearly equal intervals, at the extremity of the nervure; they are near together at base, and short, the second runs very straightly to external margin, the first and third, on either side of the second, are opposedly arcuate. The discal fold is prolonged beyond the closed discal cell, and is continued on the interspace above first m. nervule. The fourth m. nervule is very widely separated from the third at base, since it springs from the nervure at a point about midway between the base and the point of origin of the third m. nervule; it runs straightly to the margin, but the interspace, which is very wide at base, is narrowed towards the margin, owing to the arcuation of the third m. nervule and its downward course. A prominent sub-median fold, parallel with internal margin and continu-

ed. Internal, or sub-median nervure, nearly straight and parallel with the margin.

Secondaries, large, somewhat pyriform; costa long, straight, depressed towards the apex, which latter is blunt but rather produced; external margin rounded, a little produced medially; anal angle improminent; internal margin straight. The nervulation recalls *Callalucia*; the second and third m. nervules spring from one point at the extremity of the nervure; first, a little removed, springs from the cross-vein which closes the discal cell; fourth, at a point about two-thirds of the length of the nervure from the base, thus its position is here much nearer removed towards the extremity of the m. nervure, than its analogue of the primaries. This removal of the fourth m. nervule towards the base of the nervure, seems to influence the shape of the anterior wings.

This finely and thinly scaled genus is very distinct, in the shape of the wings, from any of the genera allied to *Pericopis*, that I have been able to compare, and is readily distinguished from that genus by the singularly straight external margin of the primaries and their triangular shape.

***Sphaeromachia cubana.***

*Pericopis cubana*, Herrich-Schaeffer, C. B. Reg. No. 9, p. 131. (September, 1866).

♀. Head, blackish, with two lateral white bands on the "front," behind the antennal insertions are two white dots. "Collar," blackish, dotted with white. Thorax and patagia, anteriorly, blackish dotted with white; behind, the thoracic parts are very pale greenish-yellow. Abdomen, very pale greenish-yellow, without markings, except a lateral, brownish, distinct, stigmatal line. Legs and under thoracic surface, pale, the former striped with blackish or brownish outwardly.

Wings, sub-diaphanous, very pale greenish-yellow. Primaries blackish along costa to basal third; these dark scales are margined inferiorly by the median nervure, and enclose three scarlet patches, which are fused on the under surface and here hardly disconnected. At the extremity of this dark costal patch, the dark scales are continued downwards, forming a distinct oblique band, joining the internal margin near the angle and fusing with the dark terminal color of the wing. Beyond this, the ground color of the wing forms a coincident, broad, oblique band. Terminally, the wing is blackish, the dark space being very wide on costa, commencing at about its middle, and very narrow at internal margin where it merely covers the angle. Superiorly, two sub-equal, oblique, sub-diaphanous, broad, pale bands, intersected by

the s. c. nervules. Along and within external margin, three or four interspaceal, unequal, pale spots. Secondaries with a narrow, rather even brownish-black band along external margin, enclosing a larger, pale, apical spot, and three or four smaller, triangular spots before anal angle. Expanse, ♀, 2.60 inches. Length of body, 1.00 inch.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc. Phil.

*Number 597, Poey's MS. Catalogue.*

**MELANCHROIA**, Hübner.

*Melanchroia fumosa*, n. s.

♂, ♀. Smoky black. Head and thorax dark honey-yellow, legs pale smoky; abdomen, above, smoky black, beneath, except centrally, honey-yellow, a little paler than thorax. Antennæ, smoky black. The anal valves in the male are very long and prominent, clothed with honey-yellow scales and laterally at their base with paler spreading scales.

Primaries, smoky black, all the "veins" brought distinctly into relief by paler scales, an apical white patch; fringes, except where bordering the white apices, dark.

Under surface resembling upper, except that the veins are not marked with paler scales.

Secondaries, smoky black, immaculate; fringes at apices broadly marked with white. Under surface resembling upper. In the single ♂ specimen I have before me, the "veins" on the under surface are beautifully brought into relief by pale scales, unlike the female in this respect, and more distinctly than on the upper surface of primaries in either sex, perhaps partly owing to the somewhat darker hue of the posterior wings. Expanse, ♂ and ♀, 1.50 inch. Length of body, 0.60 inch.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc. Phil.

*Number 599, Poey's MS. Catalogue.*

In size and ornamentation this species bears a close resemblance to *M. cephise*, Hübner ("Verzeichniss"). It differs by the absence of the intense blue-black color of the wings which is expressed by Cramer, who originally figures the species, in the words: "sur le fond noir se trouve un chatoyant bleu obscur."—Exot. Vol. IV, p. 182. I have a specimen from Mexico, which I owe to the kindness of Mr. W. H. Edwards, which has this peculiar blue-black ground color, and differs in this respect from the Cuban species, as well as by certain less prominent and comparative characters, so far as I can judge from a single specimen. The general color of the two insects is very distinct, when compared together.

*Melanchroia cepheis*, *Hübner*, "Sammlung," (not "Verzeichniss") seems to me to represent the smoky black *M. fumosa*, and not the blue-black *Phalaena cepheis*, *Cramer*, contrary to the intention of the German Entomologist, who intended to illustrate *Cramer's* species.

***Melanchroia geometroides.***

*Melanchroia geometroides*, Walker, C. B. M. Lep. Het. Part 2, p. 387. (1854).

*Glaucopsis mors*, Lucas, Hist. Nat. Cub. p. 663. (1857).

Mr. Walker gives "Java," as the habitat of this species in the British Museum Lists. The diagnosis there given agreeing exactly with my specimens, I was led to doubt the correctness of this locality, the more so as I regarded the genus as purely American in its character. Upon communicating by letter with Mr. Walker on the subject, I have been kindly informed that there is every probability that the British Museum specimens came from Jamaica, and that a mistake has arisen from the similarity of the customary abbreviations for these two localities. I have examined several specimens (♂ and ♀) of this slightly variable but very simply marked species, which I have no doubt, from the diagnosis, has been redescribed by Lucas as above cited.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 483, *Poey's MS. Catalogue.*

**DIOPTIS, *Hübner*.**

***Dioptis vinosa.***

*Sphinx vinosa*, Drury, Exot. Vol. I, p. 47, Pl. 23, fig. 4, et Vol. II, App. (1770).

*Callimorpha? vinosa*, Westwood, Drury, Vol. I, p. 43, Pl. 23, fig. 4. (1837).

*Dioptis vinosa*, Walker, C. B. M. Lep. Het. Part 2, p. 332. (1854).

*Hyalurga vinosa*, Herrich-Schaeffer, Cor. B. M. Reg. No. 9, p. 131. (September, 1866).

I adopt Mr. Walker's generic determination for this species, since this is apparently congeneric with *D. cyma*, *Hüb.* the type of *Dioptis* in the "Verzeichniss." Other species and groups referred here by Mr. Walker, seem to need revision. *D. vinosa*, is variable as to color and size; sometimes the sub-terminal, oblique, ferruginous or honey-yellow band, of the upper surface, is entirely obsolete. Its variability suggests, that *Dioptis rica*, *Hübner*, has been improperly considered as distinct from the present, the oldest illustration of the genus.

*Habitat.*—Cuba, (Poey). Coll. Ent. Soc. Phil.

Number 204, *Poey's MS. Catalogue.*



## SUPPLEMENT.

With the present Paper I close my Notes on the first families of Cuban Moths, as represented by Prof. Poey's Collection. I have been fortunate in having the independent observations of Dr. Herrich-Schaeffer, of Regensburg, on very similar material, sent by Dr. Gundlach, and it affords me pleasure to see that we have nearly always coincided in our specific determinations, that is to say as to what species were new to science, or had been previously recognized by Authors. With regard to our generic and family determinations, I have not been so fortunate as to agree with this distinguished Entomologist. It remains for me but to direct the attention of the student to the classificatory arrangement of the Sub-Order by Dr. Herrich-Schaeffer in the "Lep. Exot. Nov. etc.," in order to account for classificatory views, which, since they are singular with the Bavarian Entomologist, must be my apology for the want of unity displayed by our respective Papers as to the natural arrangement of the material therein discussed. I shall content myself for the present with a few remarks as to the artificiality and incongruity of one of Dr. Herrich-Schaeffer's generic groups, leaving my comprehension of the most natural arrangement of these Moths as discussed in my Papers, and as expressed in the succeeding list of the Cuban species of Sphingidæ, Ægeridæ, Zygaenidæ and Bombycidæ.

And first in correction; Dr. Herrich-Schaeffer (Corr. Bl. No. 8, Aug. 1866, p. 117) says: "Im Eingange sagt er dass er *Melanchroia* und *Ctenuchidia* (*virgo*) zu der Subfamilie der *Lithosiinen* setzt," etc. This is speaking of my paper on the Bombycidæ of Cuba, where in the Introduction exactly the reverse of what Dr. Herrich-Schaeffer says is recorded. I wrote: "When we separate from this Family the Zygaenid genera, *Melanchroia*, *Ctenuchidia*," etc., showing that I did not consider these genera as Lithosians but as Zygaenidæ, and they will be found arranged with the other genera of the latter Family.

Dr. Herrich-Schaeffer's genus "*Charidea*," contains not only perfectly dissonant material, but even species belonging to two very natural and distinct Families, viz: Zygaenidæ and Bombycidæ. Typically considered, Dalman's genus is Zygaenid, and should be limited to species such as *C. fulgida*, *C. bivulnera*, *C. splendida*, *C. fulgens*, *C. fastuosa*, etc. In the Corr. Blatt, No. 8 (Aug. 1866), p. 116, Dr. Herrich-Schaeffer refers *Erithales guacolda*, *Poey*, *Uranophora ohalybea*, *Hübner*, and *Carathis gortynoides*, *Grote*, with other equally ill-selected material, to *Charidea*; whereas the first and last are dis-

tinct genera of Bombycidæ, and the second is a Zygaenid allied to *Apistosia*, *Ctenucha* and *Ctenuchidia*, but affording a distinct generic type.

No characters of generic or family significance hold together *Urano-phora* and *Carathis*; as well might both be referred to *Sphinx*, as to *Charidea*. I have altered the position of *Carathis* to the sub-family *Arctiidæ*, where I am satisfied it most naturally stands. It is a difficult genus of unusual habitus, and the characters which induce my present reference are those which ally it to *Eupseudosoma*, and allied genera. But both *Carathis* and *Erithales* are valid genera, and both belong to the family Bombycidæ. Dr. Herrich-Schaeffer is then accountable for his fresh synonyms of these species which had been previously properly named by Authors.

Owing to the circumstance that Dr. Herrich-Schaeffer and myself were contemporaneously engaged in writing on these Moths, the following synonyms have occurred, which I here enumerate in the order in which the insects were given in the pages of the *Correspondenz Blatt*:

**BURTIA**, Grote.

*Burtia rubella*, Grote. (Plate 5, fig. 1, ♀.)

*Burtia rubella*, Grote, Notes Zyg. Cub. Part 1, P. E. S. P. Vol. 6, p. 186, (14.) (July, 1866.)

*Gundlachia cruenta*, Herrich-Schaeff., Corr. Bl. No. 7, p. 108. (July, 1866.)

The name *Gundlachia*,\* having been previously used in *Mollusca*, the name which I have given to this species, at the same time, will be properly retained. There is also a "*Glaucopis cruenta*, Perty," which might cause confusion in the specific name proposed for this species by Dr. Herrich-Schaeffer.

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\* This name has also been provisionally used by Mr. E. T. Cresson for a genus of Cuban hymenoptera.

I have since received three fresh (♀) specimens of *B. rubella*, from Dr. Gundlach, differing from my original specimens as follows: the legs, though "whitish" inwardly, are outwardly entirely sanguineous. The slender palpi are held apart and are projected beyond the "front." The two sanguineous spots of the primaries are obsolete. The anal hairs and margins of the wings are blackish, not "brown." These differences are partly to be attributed to inconstancy and partly to the condition of the original specimens in which the palpi were defective. This species, with its bright crimson or sanguineous body and frail, vitreous, narrowly margined wings, is unusually beautiful in appearance, even when compared with its brilliant associates.

**HORAMA**, Hübner.**Horama diffusa**, Grote. (Plate 5, fig. 2. ♂.)*Horama diffusa*, Grote, Notes Zyg. Cub. Part 1, P. E. S. P. Vol. 6, p. 181 (9.) (July, 1866.)*Horamia pretellus*, H.-S., Corr. Blatt, No. 8, p. 113. (Aug., 1866.)**CALLICARUS**, Grote.**Callicarus pennipes**, Grote. (Plate 5, fig. 3. ♂.)*Callicarus pennipes*, Grote, Notes Zyg. Cub. Part 1, P. E. S. P. Vol. 6, p. 182 (10.) (July, 1866.)*Horamia plumosa*, H.-S., Corr. Blatt, No. 8, p. 113. (Aug., 1866.)

It will be seen that both Dr. Herrich-Schaeffer and myself have separated as new and distinct these Cuban species, which resemble the long since described *Horama pretus*, *Cram.* sp., and *Callicarus plumipes*, *Drury* sp. In addition, I have shown the existence of a third species, *Callicarus texanus*, *Grote*, from Texas. The two genera are amply distinct in my opinion. By an error of spelling, apparently copied from Walker, Dr. Herrich-Schaeffer gives Hübner's genus as "*Horamia*."

**EUNOMIA**, Hübner.**Eunomia insularis**, Grote. (Plate 5, fig. 4. ♂.)*Eunomia insularis*, Grote, Notes Zyg. Cub. Part I, P. E. S. P. Vol. 6, p. 188 (16.) (July, 1866.)*Glaucopis elegantula*, H.-S., Corr. Blatt, No. 8, p. 114. (Aug., 1866.)

On the accompanying Plate (fig. 5 ♀) I also illustrate *Formiculus pygmaeus*, *Grote*.

**EUSCIRRHOPTERUS**, Grote.**Euscirrhopterus poeyi**, Grote.*Euscirrhopterus poeyi*, Grote, Notes Zyg. Cub. Part 1, P. E. S. P. Vol. 6, p. 178 (6.) (July, 1866.)*Heterandra disparilis*, H.-S., Corr. Blatt, No. 9, p. 134. (Sept., 1866.)

I have received, through the kindness of Dr. Gundlach and Sen. Rafael Arango, specimens of the following species of Cuban Lepidoptera :

**MACROSILA**, Boisd. (Emend. m.)**Macrosila afflicta**.*Sphinx afflicta*, Grote, Notes Sphing. Cuba, p. 39. (August 1865.)*Syzygia afflicta*, G. & R., Syn. Cat. N. Am. Sphing. p. 41, Pl. 3, fig. 5 ♂. (Nov. 1865.)*Macrosila afflicta*, Walker, C. B. M. Lep. Het. Pt. 35, p. 1855. (June 1866.)

♀. A female specimen of this species, sent me by Sen. Rafael Arango, differs from the male described by me, as above cited, in the obscure green tint of the ground color of the upper surface of primaries and body parts. Also, in that there are five lateral orange yellow abdomi-

nal segmentary maculations, distinctly margined with black scales. The species is nearly allied to *M. carolina*, but is smaller than Linnaeus' species, and at once distinguished by its different color. The resemblance between these two species is analogous to that existing between *Amphonyx antæus*, and *A. duponchel*. I have been misled by the stained and defective state of the original (♂) specimen sent by Prof. Poey, and from which the figure of *S. afflicta*, as above cited, was taken. With the corrections here noted, the specific diagnosis and figure will sufficiently serve to identify the species.

Mr. C. T. Robinson has called my attention to the fact that in its maxillary and other characters, this species agrees with *Macrosila*, as restricted by myself in late papers, and that the genus *Syzygia*, is not sufficiently distinct to be received as an independent structural form. The determination of this species remains, then, as proposed by Mr. Walker in the British Museum Lists, and the genus *Syzygia* is withdrawn. The species of *Macrosila*, as now amended, are as follows:

## GROUP I.

1. *M. aper*, Boisd., H-S.!
- TYPE. 2. *M. rustica*, Walk.,! (*Sphinx rus.*, Fabr., *Sph. chionanthi*, Smith).  
 3. *M. ochus*, Grote,! (*Sphinx och.*, Klug; *Macr. instita*, Clemens).  
 4. *M. afflicta*, Walk.,! (*Sphinx affl.*, Grote).  
 5. *M. carolina*, Clemens,! (*Sphinx carolina*, Linn).  
 6. *M. quinquemaculata*, Clem.,! (*Sphinx quinquem.*, Haworth; *Phlegethontius celeus*, Hübner; *Macr. celeus*, G. & R).

## GROUP II.

7. *M. cingulata*, Clemens,! (*Sphinx cing.*, Fabr.; *Sph. convolvuli*† Drury, Smith; *Sph. druroei*, Donovan, Steph., Wood).  
 8. *M. convolvuli*, G. & R.,! (*Sphinx convol.*, Linn).

For the sequence of the initiatory genera of the Tribe *Sphingini*, I refer here to a recent Paper by Mr. Robinson and myself, contained in the Annals of the New York Lyceum, October, 1866. In this paper the position of the European *Sphinx ligustri*, Linn., is discussed with regard to the North American species of the genus. The elimination of the genus *Diludia*, G. & R., renders the respective homogeneity of *Macrosila* and *Sphinx*, as now considered, sufficiently apparent, as to justify the view that these two latter are distinct structural forms. The North American species hitherto referred to *Dolba*, Walk., and *Hyloicus*, Hübner, may in future need a generic revision. *Hyloicus coniferarum*, Hübner, as illustrated by Abbot, has not been identified by us; the probability has been already suggested that *Ellema harrisii*, Clem., is the species intended by Abbot.

**CROCOTA**, Hübner.***Crocota pallicornis*, n. s.**

Wings, full; size, moderate. Primaries dark ferruginous tawny, a little paler subterminally, with obsolete ornamentation. Costa arched from base to apex, the latter a little depressed. External margin nearly straight, a little rounded, hardly oblique. At extreme base a small aggregation of white scales, and the wing seems to be dusted very sparsely with whitish scales. A blackish discoloration beyond the discal cell, and one, fainter and smaller, situate above internal nervure. The subterminal space is indicated by a paler shade, which is rather distinctly margined inwardly, the wing gradually deepening in color again to external margin. Secondaries, pale dull rosy or reddish ochreous, contrasting with the dark primaries and general color; a blackish discal dot and one before the anal angle.

Head, palpi and thorax, dark ferruginous tawny; palpi, approximate at the tips, projected horizontally; the head is rather small. Antennæ, moderate, rather short and stout, covered with dull, obscure whitish scales, which are characteristic. Abdomen, above, concolorous with secondaries.

Under surface of the wings dull, reddish orange; primaries a little the darker; a blackish, discal dot on both pair, otherwise immaculate. Legs and under surface of abdomen, a little darker than primaries beneath; the former are mostly dull brownish externally. Exp. ♀, 1.10 inch. Length of body, 0.45 inch.

*Habitat*.—Cuba, (Gundlach).

Number 604, *Gundlach's MS. Catalogue*.

*C. pallicornis*, is the third Cuban species of the genus described. It is more nearly allied to *C. disparilis*, *Grote*, than to *C. heros*, but the thick, whitish antennæ and very different ornamentation will separate the two sufficiently. From what I have seen I conjecture that the Cuban *Crocotas* are more constant in their ornamentation than our United States species, but I would draw the attention of the Cuban Entomologists to the fact of the known variability of species of this genus, so that they may avoid the erection of species on slight differences, as has been done with regard to our species from the Atlantic District.\* I would finally mention the circumstance that, in the set

\* Dr. Herrich-Schaeffer, speaking of the Cuban *C. heros*, *Grote*, and *C. disparilis*, *Grote*, (Corr. Bl. p. 118, No. 8, Aug. 1866) says: "Ausser diesen beiden cubanischen Arten besitze ich 7 aus den Vereinigten Staaten, zu deren drei ich keine Beschreibung finden kann, welche aber möglicher Weise zum Theil oder alle den Arten von Reakirt entsprechen." With a numerous series of spe-

specimen of *C. pallicornis*, when the two blackish discolorations of the primaries are considered with the two dots on the secondaries, an imaginary line may be drawn, nearly straight, slightly bent inwardly, so as to include these four maculations.

cimens before me, I am strongly inclined to doubt the existence of so many species from the Atlantic District of the United States. Judging from my material and Hübner's figures of *Eubaphe aurantica*, and *Crocota rubicundaria*, I should refer both of these (as well as probably Mr. Walker's *C. rubicundaria*) as forms of the common *C. ferruginosa*, Walk. Indeed, where writers have referred to *C. rubicundaria*, I think their material has been immaculate specimens of this species of Mr. Walker's. As early as April, 1863, I have shown in these Proceedings, Vol. 2, p. 31, that Dr. Clemens' opinion, that the *Arctia rubricosa* of Harris was referable to *Crocota*, and was a "variable insect," was based upon a mistake, since Harris' species belongs to the very distinct genus *Phragmatobia*, Stephens. At that time, also, I determined specimens in the Coll. of the Ent. Soc. as "*Phragmatobia* (*Arctia*) *rubricosa*, Harris," as will be seen by reference to the list of species, given as determined by myself, on page 23 of the same Volume, under date of April 1863.

Leaving *Crocota treatii*, Grote, from present consideration, since this species is very distinct from any of the rest of the genus by its lithosiiform appearance and coloration (resembling somewhat the insect figured as "*Lithosia læta*, Boisd," in Guérin,) I cannot find more than two species in the slight, tawny, specimens which belong to the more geometriiform group of the genus, and are found from Maine to Georgia. These are the *C. ferruginosa* and *C. brevicornis* of Mr. Walker, to which I would refer also Hübner's two figures under distinct names, as varieties. Dr. Packard has given nearer details respecting these species in his "Synopsis," and my own material bears them out. I have even specimens of *C. ferruginosa*, with the "paler round spots quite distinct, reminding us of *C. quinaria*." This latter species I have illustrated typically from a Canadian specimen with five pale blotches on the upper surface of the primaries; I have it now from Texas and Virginia, with three, two, and obsolete blotches. It will be recognized by the obliquity of the external margin of primaries and the heavier body compared with the two above cited species of Mr. Walker. It comes nearer to the Cuban species I have described, in the stoutness of the corporal parts, and especially to *C. disparilis*, Grote, but has narrower wings, etc., than that species.

It is not possible to do otherwise than to refer here *C. choroina*, Reakirt, as a synonym, when we consider the known variability of *C. quinaria*. Indeed, without near details as to the comparative shape of the wings, etc., it will not be possible to describe species of *Crocota*, so that they may be identified unless, indeed, at the same time giving figures, and in this view it may be properly said, that the "Contributions towards a Monograph of the genus *Crocota*," by Mr. Tryon Reakirt, will not become available to the future Monographist of the genus, whose task is, indeed, no enviable one.

Finally, *C. opella*, Grote, may be readily distinguished by its large size, heavier and most arctiiform habitus, and its simple ornamentation. It varies from the typical form which I have figured, and in which the primaries are darkest, the secondaries most reddish, with bright reddish under surface, through a variety of shades of obscure brownish to almost entirely

**ECPANTHERIA, Hübner.*****Epantheria cyaneicornis*, n. s.**

I have but a fragment of a male specimen of this species before me, which is at once distinguished from the only other described Cuban species of the genus, *E. albicornis*, *Grote*, by the dark bluish black antennæ. The primaries are white with six series of blackish sub-cyaneous, or brownish transverse annulations and spots, broadly marked on costa. The third band shows a very distinct and large sub-quadrate costal blotch spreading over the outer extremity of the discal cell, and covering the discal cross-vein, the latter covered with darker scales so as to resemble a  $\triangleleft$ ; the terminal bands are composed mostly of interspaceal spots, while the basal bands are formed by annulations. The terminal series of reduced interspaceal spots, lying close to the external margin, is discontinued at the apex. Under surface reflecting the ornamentation of upper. What remains of the secondaries, show them to be whitish, sub-diaphanous, with a dark costal squarish patch, beyond the middle, more apparent on the under surface. Vertex, white, immaculate; white scales on the antennal scape in front; "collar," white, with two super-lateral brownish spots; "front," black. Thoracic disc, white, behind with blackish, sub-cyaneous scales: four median brownish annulations arranged in pairs; tegulæ, white, with a central annulation and a small dot, superiorly, on the inner margins. Legs, blackish, narrowly annulate with white. Exp., ♂, 1.80 inch.

*Habitat*.—Cuba (Gundlach).

*Number*  $7\frac{6}{12}$ , *Gundlach and Poey's MS. Catalogue*.

Since *E. cyaneicornis*, may be readily distinguished from *E. albicornis*, *Grote*, of which latter species I, as also Dr. Herrich-Schaeffer, have examined several specimens, by its differently colored antennæ, as well as by other characters here given, I feel authorized to give this partial description of a species which I trust will be more fully worked

blackish brown; sometimes keeping the tawny tinge of primaries above and having the secondaries obscure, sooty brown on either surface. In these darker specimens the costa and anterior femora usually retain their reddish fulvous color, otherwise the insect is evenly saturated with obscure shades on the different parts. As long as the ground color of the wings allows it, the simple, darker, discal, diffuse spots, are always perceivable; this species is never banded. Nine specimens average 1.20 inch in expanse, and 0.45 inch in length of body, as near as may be.

If my views with regard to the variability of our United States species of *Crocota* are correct, we have not more than five well established species of the genus, which with three from Cuba makes eight in all, to say nothing of *C. læta*, *Walk.*, and *C. cupraria*, *Walk.*, the latter South American, and neither of which I have ever identified. I place *Cyturus*, *Grote*, as a subgenus of *Crocota*, *Hüb.*

up by the Lepidopterists of Cuba. It is smaller than, and evidently different from, our United States *E. scribonia*, *Hübner*, while it more nearly approaches our species than does *E. albicornis*.

**EHALISIDOTA**, Grote.

*Ehalisidota fasciata* n. s. (Plate 5, fig. 7, ♂, 8, ♀.)

♂. Pale yellowish testaceous. Anterior wings, pale, yellowish testaceous, crossed by six bands defined by geminate, acutely dentate and slightly irregular and interrupted brown lines, which are also slightly powdery or atomical; the spaces between these lines is more yellowish and deeper colored than the ground of the wing. Base stained with brownish. In the first band, the geminate lines are widest apart, and apparently discontinued below the internal nervure. The second, is more irregular, and narrows below the median nervure, continued with the rest to internal margin. The third, crossing the discal cell and the middle of the wing, is most regular and evenly dentated. The fourth, is irregular, and the lines are more confused; it forms an inward curve at the extremity of the discal cell, running thence constrictedly, the lines approximate, to internal margin. The fifth, is again wider, more regularly serrate and even in its width. The sixth, rests on internal margin, and the lines are more interrupted, the outer being sub-obsolete. On the interspace above the first median nervule is a macular agglomeration of brown scales, which is of specific importance. The costal region is more yellowish than the rest of the wing included by the geminate lines. Beneath, the wing is dull testaceous, costal region stained with dull, pale brownish; basally, the markings are obsolete; but terminally, the geminate lines of the upper surface are reproduced, superiorly most distinctly.

Posterior wings, pale yellowish testaceous, with a faint, brownish tinge inferiorly along internal margin; this darker shade is, however, diffuse and indistinctly limited. A small, pale, brownish discal spot at the extremity of the discal cell, immediately beyond which is a submacular, interrupted, pale brownish median band, apparent centrally but discontinued towards internal margin below the fourth m. nervule. Under surface paler than upper; on the costa, within its middle, a brownish maculation. The median band of the upper surface is here much more distinct and characteristic. It is interspaceal and broken above the discal fold; the discal dot is plainly part of the second cluster of brown spots, which form the lower part of the median band; the latter is curved at the extremity of the discal cell so as to include it. Fringes short, concolorous with the wing on both pair. Head, large;



front stained with brownish. Antennæ, long, very strongly, heavily and evenly pectinate; the antennal stem, above, covered with pale testaceous scales; the pectinations pale, dull brownish. Collar, stained with brownish. Tegulæ, dull yellowish testaceous, immaculate. Abdomen, ochreous yellow above, stained with brownish laterally and towards anal segment, leaving this latter pale clay-color, or pale yellowish testaceous. Palpi, a little paler than front, with scattered brownish scales. Under thoracic parts clothed with mixed brown and yellowish hair. Legs, mostly pale clay-color; posterior tibia with a brown dot below the femoral joint. Exp., 1.75 inch. Length of body, 0.75 inch.

♀. Resembles the male; the general color is lighter. The geminate brown lines on the primaries are more interrupted and atomical, wider apart, and the space within them is more purely yellowish. The head, collar, base of the wings and abdomen, want the brownish discolorations of the male. The secondaries are immaculate, and want the median band, which is so characteristic in the opposite sex. On their under surface, however, there are two costal marks, indicating its obsolescence and a few dark scales, below the outer of these marks, on the discal cross-vein. Antennæ, whitish testaceous on their upper surface; beneath, shortly and evenly bi-pectinate. The thoracic squamation is mixed with a few blackish scale points. The eyes are covered with obscure reddish-purple hirsuties. Exp., 2.40 inches. Length of body, 0.85 inch.

*Habitat.*—Cuba (Gundlach.)

*Number* 664, *Gundlach's MS. Catalogue.*

A smaller species than *E. luxa*, *Grote*, which it much resembles. The marks on the secondaries, which are perhaps shared by other males of the genus, and the aggregation of brown scales on the outer geminate band of the primaries above first median nervule, are distinctional characters.

The discovery of the male *Euhalisidota*, adds much to the comprehension of the generic characters. The large head and plumose antennæ, which remind one of *Ammalo*, *Walker*, together with the Pattern of the Ornamentation, combine, in addition to the other characters I have elsewhere noted, to give a peculiar aspect to a very natural genus of Moths which may be purely Cuban, but will, perhaps, receive accessions from the other Islands of the Tropical Insular District. The squamation is thin and powdery, especially on the ♀ abdomen, whence it is very easily removed by attrition. The genus appears to

sustain a somewhat similar relation to *Halisidota*, *Hübner*, with that born by *Leucarctia*, *Packard*, to *Spilosoma*, *Stephens*. It is an outgrowth, so to speak, with fresh affinities.

I indicate the existence of another species of *Euhalisidota*, allied to *E. fasciata* and *E. scripta*, from a ♀ specimen sent me by Dr. Gundlach, under the Numbers  $\frac{5}{2}\frac{5}{2}$ , and which differs from the former by the uniform testaceous clay-colored primaries and by the continuity of the geminate lines. From *E. scripta*, this species differs by the immaculate legs and the fainter markings of the primaries above. This specimen is similarly sized with *E. fasciata*, though perhaps a little stouter. I leave its description and elimination to the Cuban student.

***Euhalisidota scripta*, n. s.** (Plate 5, fig. 9, ♀.)

♀. Size, moderate. Primaries, yellowish testaceous of a rather dull or obscure shade, covered by six very distinct bands defined by geminate brown lines, within which the spaces are filled in with darker scales than the ground color of the wing, and often brownish or but little paler than the lines themselves. The first of these bands, at base, is prominently dentate on median nervure. The interspace is dull yellowish. The second and third bands, before the middle of the wing, are approximate and fused five times, as near as may be, leaving the ground color of the wing to appear as paler spots between them. Their interspaces are clouded with brownish. The fourth band, with the fifth and sixth, is more oblique and is narrow, confused, somewhat irregular and constricted, most strongly filled in with brown, so as to render the marginal geminate lines indistinct. On internal margin the inner of the marginal lines joins the outer marginal line of the third band, so that the space between the third and fourth bands, where the paler ground color of the wing obtains, is broadest at costa, and tapers dentatedly to internal margin. The fifth and sixth bands are distinctly margined, broad (the marginal lines being wider apart), and but little darker than the ground color of the wing. Under surface pale testaceous; the markings of the upper surface are here faintly reproduced. Secondaries, testaceous; towards the base and along internal margin, the scales become denser and longer and are of an obscure, pale brownish testaceous hue. Under surface paler, with brown, costal marks. Palpi, rather small, yellowish testaceous, with linearly arranged brownish scales on their outer surface. Maxillæ, as usual, moderate, opaque brownish. Head, yellowish testaceous; between the antennal insertions, stained with brownish. Collar with

two supra-lateral brownish annuli, and fringed with brown scales. Abdomen, above, dull brownish ochraceous; this darker color very neatly defined, and contrasted with the whitish, clay-colored squamation of the under and lateral abdominal surfaces. Legs, testaceous clay-colored, interruptedly maculate and annulate with brown; fore femora distinctly ochreous on the inside. Exp., 1.80 inch. Length of body, 0.70 inch.

*Habitat.*—Cuba, (Gundlach.)

*Number*  $\frac{75}{327}$ , *Poey's and Gundlach's MS. Catalogues.*

The smallest species of the genus yet discovered. The banded legs and distinct markings of the primaries are sufficiently characteristic. The upper surface of secondaries and abdomen are slightly more obscurely colored than usual.

***Euhalisidota alternata*, n. s.** (Plate 5, fig. 10, ♀.)

♀. Size, large. Primaries, white, with bright brown bands. These are, as usual, six in number, but want the usual geminate, marginal, narrow, darker lines. The basal band is strongly dentate superiorly, the outer projection fusing with the second band, interrupted with white inferiorly and obsolete below internal nervure. The second band is broad, outwardly projected on the discal cell, and below the median nervure is inwardly arcuate to internal margin, where it is fused with the third band. Below the median nervure it is slightly interrupted with white scales. The third band is approximate to the second, and consists of two broad, bright brown, marginal scalloped bands or lines; the space between these is white, except on costa and internal margin, where it is filled in with concolorous bright brown. The appearance of this band is suggestive of the fact, that the bands are in reality similarly composed with those in the other species, but that the marginal lines are broader, and the bands being generally filled in with concolorous scales, are hence more homogenous in appearance. The fourth band is irregularly margined, entirely filled in with bright brown scales, and, with the fifth and sixth, more oblique and even than the basal bands. The fifth, is narrower, with a few central pale scales, and interrupted obsoletely above first median nervule. The sixth, is produced inwardly on the nervules, broadest at apex and tapering to internal angle, before which it becomes obsolete. Terminally the white color narrowly prevails on the interspaces. Fringes, white, interrupted with brown at apex and interspaceally, except between fourth median nervule and internal angle. Under surface, whitish; the markings of the upper surface are here faintly reproduced.

Posterior wings, whitish testaceous, thinly clothed with scales, which, however, become longer inferiorly and at base, where they are slightly tinged with yellowish. Under surface, whitish, with two costal brown macular discolorations, of which the one nearest the base of the wing is much the larger. Head, whitish; clypeus narrower than usual; brown between the antennæ at base. "Collar," white, with two diffuse brown annulate marks. Patagia and thorax, whitish, with brown diffuse markings.

Antennæ, long, whitish clay-color above; beneath very shortly and finely pectinate. Abdomen, stout, ochreous above, whitish laterally and beneath with diffuse central and lateral brownish markings. Legs, whitish clay-color, interruptedly maculate with brownish. Anterior coxæ, femora and tibiæ, ochreous on the inside, as are also very narrowly the middle and hind femora. Exp., 2.10 inches. Length of body, 0.85 inch.

*Habitat*.—Cuba, (Gundlach.)

Number 743, Gundlach's *MS. Catalogue*.

A very fine and distinct species, differing from the other species of this genus, in the slightly smaller head and finely pectinate antennæ. There is great uniformity in the coloration of the abdomen and legs in the species of *Euhalisidota*, and *E. alternata*, hardly differs from the rest of the genus in this respect. The palpi have been broken off in my specimen, which is otherwise in fine preservation. The abdomen is very stout with the same mealy squamation, and the species seems strictly congeneric with *E. luxa*, and the others that I have described under the genus *Euhalisidota*, *Grote*.

#### **NELPHE**, Boisd.

##### **Nelphe confinis.**

*Charidea (Nelphe) confinis*, H.-S., *Lep. Exot.*, pp. 74 & 81, fig. 277.

Dr. Gundlach sends me an old and faded ♀ specimen which, while evidently belonging to this genus, I conclude belongs to the species figured by Dr. Herrich-Schaeffer as above cited. The black colors of the wings have become of a faded brown by etiolation. The genus falls in between *Halisidota* and *Erithales*, and is perhaps the last of a number of genera which prepare us for *Erithales*, from which latter genus *Nelphe* seems to take the peculiar abdominal style of ornamentation.

*Habitat*.—Cuba, (Gundlach.)

Number  $\frac{428}{87}$ , Gundlach and Poey's *MSS. Catalogue*.

**ERITHALES**, Poey.**Erithales proxima**, n. s.

♂. Anterior wings rather pale ashen, evenly and closely grained with darker scales; a distinct black discal dot; faint traces of two extra discal transverse lines, formed by an aggregation of the darker scales; the inner of these lines appears to be angulated opposite the disc and slightly waved; a terminal series of black points. Posterior wings darker than anterior, brownish cinereous, immaculate. Under surface of both wings darker than secondaries above, without markings, evenly colored, the primaries the darker. Head and thorax, above, nearly concolorous with anterior wings. Antennæ plumose. Beneath, the thorax and legs are dull, pale brownish, like the under surface of the wings; legs a little the darker. Abdomen, above, yellow, at base covered with longer, pale brownish scales; beneath, the venter is dark brown, margined, laterally, by obscure whitish shade stripes, succeeded by pale brownish stigmal vittæ. Exp., 1.30 inch. Length of body, 0.50 inch.

*Habitat.*—Cuba, (Gundlach.)

*Number* 649, *Gundlach's MS. Catalogue.*

Somewhat larger than *E. guacolda*, *Poey*, and apparently differing specifically by the characters of the paler primaries, which are destitute of the numerous black maculations characterizing Prof. Poey's species, as well as by the obsolescence of the abdominal dorsal dots. This genus is allied to *Euchætes*, *Harris*.

**EUPROCTIS**, Hübner.**Euproctis pygmaea**, n. s. (Plate 5, fig. 11, ♂.)

♂. Size, small. White. Primaries pure white above, with a broad, distinct, zig-zag, perpendicular streak of bright ferruginous scales, resting on the internal margin within the angle. On the median nervules, superiorly, slight aggregations of similarly colored scales. Fringes, rather long, white. Beneath, whitish, with a cinereous or smoky tinge, which deepens into blackish along the costa.

Secondaries, above and beneath, whitish, with a faint, smoky tinge; fringes long, white. Antennæ, rather short, pectinate, curved in the specimen so that the tips approach each other; the pectinations are blackish; at base, the antennal stem, above, is covered with white scales. Head, comparatively large, clypeus wide, smoothly scaled as are the small palpi—all white. Abdomen concolorous with secondaries above and beneath; shorter than internal margin of secondaries. Legs, white, mostly finely scaled; tibiæ, and tarsi at base, heavily fringed

with long, white hair; anterior legs narrowly blackish inwardly. Exp., ♂, 0.60 inch. Length of body, 0.20 inch.

*Habitat*.—Cuba, (Gundlach.) Coll. Ent. Soc. Phil.

Number 750, *Gundlach's MS. Catalogue.*

**Euproctis fumosa, n. s.**

♀. Size, moderate; wings rounded. Anterior wings white, slightly silky; a broad, diffuse, oblique, pale, smoky brown band occupies the wings subterminally, leaving a narrow, white terminal space, and is intersected indistinctly by the white scales clothing the median nervules, its outer margin following the shape of the wing, roundedly projected inwardly below costa, which latter it does not attain. The rather long fringes are pale, smoky brown. Posterior wings quite pale, smoky brown, becoming whitish at the base; fringes a little paler than on primaries. Under surface of primaries, largely pale smoky brown, whitish at base; a very narrow, terminal whitish line. Secondaries entirely whitish; fringes dark, as on upper surface, on both pair. Antennæ, short, simple, white above. Head and thorax, white, "collar," a little stained. Abdomen whitish. Legs, whitish, pale brownish inwardly, as are the tarsi; tibiæ clothed with longer lateral white hair. Exp., 0.90 inch. Length of body, 0.35 inch.

*Habitat*.—Cuba, (Gundlach.)

Number 654, *Gundlach's MS. Catalogue.*

**EDEMA, Walker.**

**Edema insularis, n. s.**

♀. Dull brownish. Palpi prominent, obliquely ascending, porrect, third article elongate. The superior caputal scales and the "collar" are paler than the thorax and patagia, which, with abdomen and legs, are dull brownish, but little paler than the wings. Inwardly, the legs are clothed with darker scales; tarsi, narrowly subannulate with whitish.

The primaries, in ornamentation, recall our United States *E. albi-frons*, *Walk.*; the external margin seems shorter and hardly so oblique, while the general color is obscure brownish, not cinereous, and the markings differ in detail. There is a basal geminate dentate half-line. Beyond, a geminate, dentate, distinct, transverse anterior line, which is outwardly arcuate superiorly. All the transverse lines are of a darker brown than the ground color of the wing, which shows scattered, darker scales on the "veins." Median space, narrow; superiorly darker shaded than on internal margin; a discal linear discoloration, below which a dark, shaded spot. Outwardly, the median space is de-

fined by a darker shade line, which is very prominently projected below costa, and is succeeded by a transverse double row of blackish dots with white accessory scales. A narrow, short, oblique whitish apical shade, which is far less prominent and continued than in *E. albifrons*. Beneath this, a diffuse, terminal dark shade. The terminal line is interrupted on the nervules, and is straight, not regularly lunulate as in *E. albifrons*. Fringes darker, with a terminal, pale shade, and interrupted with paler stains at the extremity of the nervules. Secondaries, unicolorous brownish, immaculate, a little paler at base; fringes, whitish.

Under surface, brownish, immaculate, becoming a little paler on the secondaries and at base of primaries; the apices of these latter tinged with whitish. Exp., ♀, 1.70 inch. Length of body, 0.80 inch.

*Habitat*.—Cuba, (Poey.) Coll. Ent. Soc. Phil.

*Number 233, Poey's MS. Catalogue.*

This more robust species differs from *E. albifrons*, in the longer palpi; while I have detailed above, in the body of the description, the characters of ornamentation which separate it from its Northern congener.

The remarks of Dr. Herrich-Schaeffer, Corr. Bl. Reg. No. 9, p. 134, Sept. 1866, called my attention to the Noctuidæ contained in Prof. Poey's Collection. Among them I found the specimen which I have above described under the Notodontid genus *Edema*, *Walk.* I had already examined a species of *Crino*, *Hüb.*, (No. 231) and *Nysalea*, *Guenée*, (No. 307,) both of which latter I am still disposed to regard as Noctuidæ and not Bombycidæ. I have not been able to find any specimen with the etiquette "473," a No. mentioned by Dr. Herrich-Schaeffer as attached to a specimen belonging to a Notodontid genus, and sent by Dr. Gundlach. *Euthisanotia timais*, *Hüb.*, and *Euglyphia hieroglyphica*, *Walk.*, (*Bombyx festiva*, *Fabr.*; *Euglyphia elegans*, *Hüb.*), the latter primarily illustrated by Cramer, and described by Guenée under the name of *Noropsis fastuosa*, are represented in Prof. Poey's Collection by specimens from Cuba; both of these species have already been properly referred to the Noctuidæ by various Authors. I mention this circumstance here in connection with a letter received from Prof. Poey on the subject, and also since these species are enumerated among the "Bombycites" of the Collection in the MS. Catalogue of the Professor.

In the pages of the "Repertorio fisico-natural de la isla de Cuba," will be found notices by Prof. Poey of certain of my Papers. In the

first of these notices, contained in the Number for December, 1865, exceptions were taken to certain of my remarks, and additions were made to my synonymical citations to a number of species of North American Sphingidæ. Subsequently, however, what was objectionable to me in this notice, because it was also erroneous, was in great part withdrawn, and I have no desire to go again over the various points discussed, referring the student to my subsequent Papers, written with Mr. Robinson, on the Synonymy of the North American Sphingidæ.

With reference to the expressions of friendly feeling and respect towards myself, which have been elicited from Prof. Poey in the pages of the Repertorio, I thank him kindly for his consideration, and take them rather as indices that the Cuban scientists are now looking to the United States for assistance in the development of the knowledge of their Entomological fauna, than that they are deserved by my brief Papers on Cuban Moths. These tributes of appreciation are, however, more fully earned by my brother Entomologist, Mr. Ezra T. Cresson, whose work on the Cuban Hymenoptera, deservedly calls for expressions of approval.

The Lepidoptera present, perhaps, greater difficulties to the student than the other Sub-Orders of Insecta, owing to their peculiar structure; so that opportunities have been offered for the erection of numerous classificatory arrangements, which, in proportion as they are arbitrary, idiosyncratic and artificial, will be found to be less just, and to contain the seeds of their rejection at the hands of science. The genera are to a great degree comparative. Clustered round some central point of structural peculiarity, which is often overlooked in a generic diagnosis, lie a mass of comparative differences, which altogether combine to give a generic aspect easily felt, but at times difficult to define with precision. Since science is progressive, and to advance it we need new facts, we must conscientiously lay hold of all structural characters, unhindered by a fear that subsequent discoveries may possibly prove the untenability of our conclusions, and lead to the rejection of our new generic determinations.\* If our genera are fairly

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\* I would refer here to Hübner's remarks in the introductory Preface to the third Volume of the "Zutræge," pp. 3—4. These take the form of an apology for the number of new generic names introduced by him, but the justness of his generic determinations is very evident in the great majority of instances. Whatever of corroborative value is conveyed to a genus by the discovery of fresh species, has been added, in my present Papers on Cuban Zygaenidæ, to the genera *Horama*, *Apistosia*, etc. The introductory remarks of Hübner to the first Volumes of the "Zutræge," are full of modest genius and de-



founded under the circumstances, it is all we have to provide for. To be just, posterity will judge us by our own times, and not by the new light that will be then shining on the different departments of Zoölogy.

I here insert a few general remarks on the homogeneity of the Zygæninæ, and I may be the more readily excused for so doing, in that the group is first illustrated in my present papers on Cuban Moths, by an endeavor to practically arrange a portion of our numerous inter-tropical American genera.

In rising to higher considerations as to the internal arrangement of the genera of Zygæninæ, we endeavor to select those which are most extreme in the concentration or in the diffusion of their physical parts. Taking the European genus *Zygæna*, as the comprehensive type from which the genera recede above and below, we seem to terminate above in *Horama*, and below in *Diophtis*. Between these two lie the mass of generic forms, which we can arrange the more readily when we have appreciated the extremes. In selecting *Horama*, to lead the sub-family, we look for the greatest concentration of parts, and the least waste of material. Here the wings are strong and narrow, recalling the higher *Ægeriidae* and *Sphingidae*. The stout legs, impectinate and thick antennæ, well developed head and thorax, the linear yet full

vision to his science. These deserve to be carefully read by the student, while they are worthy of the attention of the cosmical Zoölogist, or the more æsthetic historian of the progress of the Natural Sciences. I know, indeed, that the publisher of the work has stated, that he has occasionally altered the phraseology ("Eigenthümlichen Sprache") of Hübner, but I am of opinion that the direct sense of Hübner's remarks is in every instance original, and bears the evidences of the study and time which, from his extended works, he must have devoted to his subject. We see, indeed, in the descriptonal part of the *Zutræge*, which we may reasonably suppose, from his unacquaintance with the subject, the publisher would leave untouched, sentences which are very roughly composed, and even ungrammatically written, but which, by their sincerity and a certain quaintness of expression, should disarm the critic. (Compare, on this point, *Ochsenheimer, Die Schmetterlinge von Europa*, Einl, pp. 13—14. I do not agree, however, with the conclusions expressed in the following sentence, commencing: "Sein Sucht, ohne Noth neue Namen einzuführen," etc.) Hübner may be considered as Boisduval, according to Prof. Poey, says: "el mejor de los iconografos,"—but not, in my opinion, as ungraciously added, by way of antithesis, "el peor de los sistematizadores." Rather has he limned with prophetic pencil, a sketch of the Sub-Order, to be filled out and perfected by succeeding scientists, and, considering the times in which he wrote and the generic conceptions of the period, his task was that of a great discoverer, of whom we may speak with reverence, even if we cannot metaphorically apply to him the words of Tasso, who writes of one more widely known:

"— avrá ardimento

All'incognito corso esporsi in prima."

abdomen, and the firm, dark, hymenopteriform tegument or body crust, together with the high development of the basal abdominal lateral valves,—are characters that, by comparison, stand out in prominent relief. This genus, with *Callicarus*, *Grote*, overlaps and stands higher in certain characters than the lower genera of the Castniaræ, such, for instance, as *Euscirrhopterus*, *Grote*, *Eudryas*, *Boisd.* and *Ciris*, *Grote*; this latter with its pectinated antennæ, seems the lowest in rank of its sub-family. Lower down, and leaving *Horama* and its ally, the wings become vitreous in *Burtia*, *Grote*, *Eunomia*, *Hüb.* and *Cosmosoma*, *Hüb.*; the antennæ affect Bombycid forms, the colors brighten, the legs weaken, the abdominal conformation is less concise. Here the genera clustering round *Zygæna*, form a brilliant yellow, scarlet, black and scintillate group, commencing with *Isanthrene*, *Hüb.*, and obtaining its fullest development in *Histiœa*, *Walk.* Below come *Echeta*, *H.-S.*, *Scepsis*, *Walk.*, *Uranophora*, *Hüb.*, and *Ctenucha*, *Kirby*; these two last are unspotted Pericopids. Here the analogies with *Lithosiinæ* (in reality a small group of lead and rose-colored, plain or striped, rarely white or spotted Bombycidæ) interfere strangely with the appearance of the moths, without affecting the affinities of these still metallic hued genera. *Ctenuchidia*, *Grote*, follows, and in *Composia*, *Hüb.*, is heralded a succession of broad-winged Pericopid genera from Asia, Africa, and America, which leaves us finally the lax and mealy-scaled *Melanchroia*, *Hüb.* and *Diopthis*, *Hüb.*, genera overlaid with Bombycid affinities, their parts thin and vague, and with a lack of concentration which is indicative of lowness of type. The family bronze and metallic coloration forsakes them,—Lucas erroneously refers *Diopthis rica*, *Hübner*, to the Bombycid genus *Callimorpha*. *Latreille*.

It may be justly remarked, that the "*Syntomina*" of Dr. Herrick-Schaeffer, including the "*Arctioidea syntomidiformia*," are not natural or homogeneous groups, but consist of either Zygænid genera with Bombycid analogies or vice versa, and that the true affinities of these genera are not recognized in thus associating them under common family appellations.

In considering the characters of the Family Zygænidæ, which in the view here presented, includes the Castniaræ and the numerous genera which, combined under different designations, precede the Bombycidæ in the British Museum Lists, I am undecided whether the *Uraniidæ* of Authors do not, in fact, belong here, and whether we are justified in rejecting these, as has been usually done to the *Phalænidæ*

(Geometridæ) or to the immediate vicinity of this latter family. The coloration of *Urania* and *Cydimon*, is Zygænid; since the species are black with metallic red and green ornamentation.

It may be hazarding too much to refer, from the mere acquaintance with a figure, any genus to a decided position, but I am impressed with the idea that the genus *Epicopeia*, *Westwood*, (*Arcana Entomologica*, Plate 5,) belongs to the Zygæninæ, as here considered, and that this highly interesting form reproduces in a lower group the tendency of the secondaries in *Lepidoptera* to become "caudate," or "bizarre" in their shape. While mimicking *Papilio*, as has been interestingly elucidated by *Westwood*, the weak corporal parts are characteristic of those Zygænid genera which become laden with Bombycid analogies.

The Zygænid sub-families, *Castniaræ*, *Boisd.*, and Zygæninæ, *Pack.*, are susceptible of tribal division, which is required by the physical structure of the moths, and will at the same time assist the comprehension of the genera. In the *Castniaræ*, the genera clustering around *Castnia*, *Fabr.*, of which the lowest North American genus is *Alypia*, *Hüb.*, may be taken as composing the more typical tribe of the sub-family; a second tribe will contain *Eudryas*, *Boisd.*, and allies. In the Zygæninæ, several tribes remain to be elucidated, for which my remarks may be of service to the classificator, but it will need an extended acquaintance with the numerous genera of this sub-family to indicate them with precision. In erecting groups higher than genera, the neurational characters should not be solely relied on; when we consider that the neuration is of comparatively no value whatever in the lower Sub-Orders of *Insecta*, partially owing to the elytriform character of the wings, we see at once, that the body characters are of higher value for the purposes of a natural classification, and that the details of the structure of the out-growths of the articulate animal are of a minor importance.

To resume, the Zygæninæ become a strong feature in the Lepidopterological faunas of the Tropics, displacing, as I have elsewhere remarked, the Bombycidæ to a great extent; the proportionate expression of this latter family in the temperate zones, becoming here reduced. In Europe, the Zygæninæ are represented principally by the genus *Zygæna*, numerous in species and strongly characterized and comprehensive in its physical and typical characters. Thus European Lepidopterists often fail to understand the relation and position of the varied Zygænid forms from intertropical Asia, Africa, and our own Continents, and are unwilling to recognize the numerous genera, with

often few species, as of a family affinity with their strongly characterized genus. In the purely American lepidopterological faunal districts of our Northern Continent, north of the Gulf of Mexico, representatives of the genus *Zygæna*, are probably wanting, and we have but few forms, in the minority of cases with European analogues, such as *Acolothus*,\* *Clemens*; *Scepsis*, *Walk.*; *Ctenucha*, *Kirby*; *Callalucia*, *Grote*; *Pyromorpha*, *H-S.*, and *Lycomorpha*, *Harris*, though these are prophetic of the Southern development of the Sub-family, or, viewing the *Zygæninæ* from their metropolis, these genera are the scanty feelers which are stretched towards our boreal regions. These contrast strongly with the prevalent *Bombycidæ* by which they are surrounded. Compared with the stouter *Sphingidæ* and *Noctuidæ*, the *Zygæninæ* and *Bombycidæ* are weaker in structure, and in effect seem more subject to climatal influence. In intertropical America, the most numerous representation of the *Bombycidæ* seems to be afforded by those *Arctiidæ*, which, in their analogies, copy the *Zygæninæ*. The weight of a prevailing Zoölogical structural form is thus best measured by its influence on its surroundings.

I give here a list of all the species of *Sphingidæ*; *Ægeriidæ*, *Bombycidæ* and *Zygænidæ*, which I am led to believe have been authentically determined as Cuban. I have elsewhere recorded Prof. Poey's opinion as to the species noticed by Lucas in the work of D. R. de la Sagra, and have only to add since examining the book, that it bears internal evidence of its unreliability as to the habitat of very many of the insects therein contained. Where these have not been mentioned by other Authorities as found in Cuba, I have accordingly very naturally disregarded them; while, in any case, the descriptions of many of the moths would prevent the recognition of the species.

I have used the following marks in this list: † after a species indicates that, while acquainted with the species, I do not know it from

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\* From the circumstance that Dr. Clemens separated *Procris americana*, generically from his *Acolothus falsarius*, the latter was not recognised by Dr. Packard, who described the species subsequently as *Harrisina Sanborni*. This species being generically identical with *Procris americana*, Dr. Packard's genus becomes synonymous with *Acolothus*, *Clemens*, while the latter appellation must be retained, following the law of priority. Our species will then be as follows:

**ACOLOITHUS**, Clemens.

1. *Acolothus falsarius*, *Clemens*! (*Harrisina Sanborni*, *Pack.*)
2. *Acolothus americanus*! (*Procris amer.*, *Boisd.*; *Procris dispar*, *Harris Cat.*; *Ctenucha amer.*, *Walk.*; *Harrisina amer.*, *Packard*; *Aglaope amer.*, *Clemens*.)

Cuba; — after a species, indicates that it is unknown to me; || signifies that the name has been previously employed; † denotes erroneous determinations; Greek letters are employed to distinguish forms which are considered as races of the preceding species. Where no authority is appended to a specific name, it is believed to be used in its present connection for the first time in the present list. I am indebted to the able "List of Coleoptera of North America," by Dr. John L. Le Conte, for most of the above-mentioned marks and the wording of their significations.

## SPHINGIDÆ.

## MACROGLOSSINI.

**HÆMORRHAGIA**, G. & R.*thysbe*, G. & R.†*Sesia thysbe*, Fabr.*Sphinx pelægus*, Cram.*Sesia cimbiciformis*, Steph.**ÆLLOPOS**, Hübn.*tantalus*, Hübn.*Sphinx tant.*, Linn.*Sphinx zonata*, Drury.*titan*, Hübn.*Sphinx tit.*, Cram.*Macrogl. balteatum*, Kirtl.*Macrogl. annulosum*, Swain.**EUPYRRHGLOSSUM**, Grote.*sagra*, Grote.*Macroglossum sag.*, Poey.**ENYO**, Hübn.*lugubris*, Walker.*Sphinx lugub.*, Linn.*Sphinx fegeus*, Cram.*camertus*, Hübn.*Sphinx Cam.*, Cramer.*danum*, Hübn.*Sphinx dan.*, Cramer.**HÆMEROPLANES**, Hübn.*pseudothyreus*, Grote.**PERIGONIA**, Boisd.*lusca*, Walker.*Sphinx lusca*, Fabr.*lefebvrei*, Grote.*Macroglossa lefeb.*, Lucas.*divisa*, H.-S.**CALLIOMMA**, Boisd.*lycastus*, Walk.*Sphinx licast.* Cramer.*Sphinx galianna*, Burm.

## CHÆROCAMPINI.

**PERGESA**, Walk.*thorates*, Walk.*Oreus thor.*, Hübn.**CHÆROCAMPA**, Duponch.*gundlachii*, H.-S.*irrorata*, Grote.*porous*, H.-S.*Oreus porc.*, Hübn.*nechus*, Lucas.*Sphinx nechus*, Cram.*Char. chiron†*, Walk.*robinsonii*, Grote.*Chæroc. falco†*, H.-S.*tersa*, Harris.*Sphinx tersa*, Linn.**DEILEPHILA**, Ochs.*calverleyi*, Grote.*lineata*, Harris.*Sphinx lin.*, Fabr. (Syst. Ent.)**PHILAMPÆLUS**, Harris.*vitis*, Harris.*Sphinx vitis*, Linn.

(id. Drury; Fabr.; W. V.; Cramer, 267, C.; Smith.)

*Dupo jussieuæ*, Hübn.*Sphinx fasciatus*, Sulz.*Philamp. juss.*, Walk.*Philamp. fasc.*, Lucas.*linnei*, G. & R.*Sphinx vitis†*, Cram. (268 E.)*Dupo vitis†*, Hübn.*Philamp. vitis†*, Walk.*Philamp. fasc.†*, Grote.

**lycaon**, Grote.*Sphinx licaon*, Cram.*Pholus licaon*, Hüb.*Philamp. satellitia*†, H-S.**labruscus**, Walk.*Sphinx labr.*, Linn.**PACHYLIA**, Boisd.**floss**, Walk.*Sphinx fic.*, Linn.*Charoc. Crameri*, Ménét.**incornata**, Clemens.*Sphinx ficus*†, Cram. 394 D.*Charoc. ficus*†, Ménét.**resumens**, Walk.**AMBULYX**, Boisd.**strigilis**, Walk.*Sphinx strig.*, Linn.**gannasous**, Walk.*Sphinx gann.*, Stoll.**SPHINGINI.****DILUDIA**, G. & R.**brentes**, G. & R.*Sphinx bront.*, Drury.

(H-S., Grote, non Boisd.)

**PSEUDOSPHEINX**, Burm.**tetrio**, Burm.*Sphinx tel.*, Linn.*Sphinx hasdrubal*, Cram.**AMPHONYX**, Poey.**antæus**, Poey.*Sphinx ant.*, Drury.*Sph. jatropha*, Fabr.*Sph. medor*, Cram.**duponchel**, Poey.**cluentius**, Poey. —*Sphinx cluent.*, Cram.**MACROSILA**, Boisd. (Emend.)**rustica**, Walk.*Sphinx rustica*, Fabr.*Sph. chionanthi*, Smith.**carolina**, Clemens.*Sphinx carol.*, Linn.**afflicta**, Walk.*Sphinx affl.*, Grote.*Syzygia affl.*, G. & R.**cingulata**, Clemens.*Sphinx convolvuli*†, Drury.*Sphinx cing.*, Fabr.*Sph. convolvuli*†, Smith.*Sph. Druræi*, Donov.**HYLOICUS**, Hüb.**poeyi**, Grote.*Erinnyis poeyi*, Gundl.**DILOPHOMOTA**, Burm.**rimosa**, G. & R.*Erinnyis rim.*, Grote.**congratulus**, Gundlach.**caicus**, Burm.*Sphinx caic.*, Cram.**ello**, Burm.*Sphinx ello*, Linn.**alope**, Burm.*Sphinx al.*, Drury.**merianæ**, G. & R.*Erinnyis mer.*, Grote.**œnotrus**, Burm.*Sphinx œnot.*, Cram.**melancholica**, G. & R.*Erinnyis mel.*, Grote.**cinerosa**, G. & R.*Erinnyis cin.*, Grote.**pallida**, G. & R.*Erinnyis pall.*, Grote.**guttularis**, G. & R.*Anceryx gutt.*, Walk.**CAUTETHIA**, Grote.**noctunifomis**, Grote.*Enosanda*|| noct., Walk.**ÆGERIIDÆ.****ÆGERIA**, Fabr.**cubana**.*Sesia cub.*, H-S.**ZYGÆNIDÆ.****CASTNIARES.****CASTNIINI.****SEIROCASTNIA**, Grote.**tribuna**, Grote.*Ephialtias trib.*, Hüb.

PROCEEDINGS ENT. SOC. PHILAD.

**EUDRYINI.****EUSCIRRHOPTERUS**, Grote.**poeyi**, Grote.*Heterandra disparilis*, H-S.

JANUARY, 1867.

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**ZYGÆNINÆ.****HORAMA**, Hübner.*diffusa*, Grote.*Hor. pretellus*, H-S.**CALLICARUS**, Grote.*pennipes*, Grote.*Hor. plumosa*, H-S.**FORMICULUS**, Grote.*pygmaeus*, Grote.**SETIODES**, H-S.*nana*, H-S.—

(an spec. præc.?)

**BURTIA**, Grote.*rubella*, Grote.*Gundlachia cruenta*, H-S.**EUNOMIA**, Hübner.*insularis*, Grote.*Glaucopsis elegantula*, H-S.*nitidula*.—*Glaucopsis nitid.*, H-S.**COSMOSOMA**, Hübner.*omphale*, Hübner.*selecta*.*Glaucopsis sel.*, H-S.\***ISANTHRENE**, Hübner.*chalciope*, Hübner.**HIPPOLA**, Walk.*"syntomoides,"* Walk.*Glaucopsis synt.*, Boisd.*minima*, Grote.**TRICHÆA**, H-S.*pilicornis*, H-S.—*seticornis*, H-S.—**EMPYREUMA**, Hübner.*pugione*, Hübner.**ECHETA**, H-S.*albipennis*, H-S.*subochrea*, Grote.*Correbia suboch.*, H-S.**CALONOTOS**, Hübner.*thetis*, Hübner.*Sphinx thetis*, Linn.*Sphinx leneus*, Cram.**ACLYTIA**, Hübner.*heber*, Hübner.♂ *Sphinx heber*, Cram.♀ *Sphinx halys*, Cram.**APISTOSIA**, Hübner.*humeralis*, Grote.*Apist. judas†*, H-S.**URANOPHORA**, Hübner.*chalybea*, Hübner.*Apistosia † terminalis*, Walk.**CTENUCHIDIA**, Grote.*virgo*, Grote.*Ctenucha virgo*, H-S.**COMPOSIA**, Hübner.*fidelissima*, H-S.**SPHÆROMACHIA**, Grote.*cubana*, Grote.*Pericopsis cub.*, H-S.**MELANCHROIA**, Hübner.*fumosa*, Grote.*Mel. cephist†*, Hüb. Sm.*geometroides*, Walker.*Glaucopsis mors*, Lucas.**AGYRTA**, Hübner.*auro*, Hübner.—*Sphinx auro*, Linn.**DIOPTIS**, Hübner.*vinosa*, Walker.*Sphinx vinosa*, Drury.**DESIDERATA\*\****Glaucopsis eximia*, H-S.*Charidea bicolor*, H-S.*Charidea cimicoides*, H-S.

\* Walker gives "Eurate selecta, Boisd.," as the original name of this species, which I here temporarily consider as forming, with other species, a group in Hübner's genus *Cosmosoma*. A synonymical list of the species figured in "H-S. Lep. Exot. Nov. a. m. Cog." would be a valuable addition to that beautifully illustrated work.

\*\* Species that I am autoptically unacquainted with, and which are briefly described under generic names that are used in too wide a sense to allow me to judge of the classificatory position of the insects.

## BOMBYCIDÆ.

LITHOSIINÆ.  
**TORYCUS**, H-S.  
*tricolor*, H-S.—  
**MIEZA**, Walker.  
*albatula*, H-S.—  
 (an *Clemensia*, Pack.?)  
**CROCOTA**, Hübner.  
*heros*, Grote.  
*disparilis*, Grote.  
*pallicornis*, Grote.  
*CYTORUS*, Grote.  
*lata*.  
*Cytorus latus*, Grote.  
**UTETHEISA**, Hübner.  
*bella*, Hübn.  
*Tinea bella*, Linn.  
*α. ORNATRIX*, Hübn.  
*Noctua ornatrix*, Linn.  
*β. SPECIOSA*, Grote.  
*Deiopeia spec.*, Walk.  
**CYDOSIA**, Westw.  
*nobilitella*, Westw.  
*Tinea nob.*, Cram.  
**ARCTIIDÆ.**  
**SPILOSOMA**, Stephens.  
*jussiae*, Walk.  
*Arctia juss.*, Poey.  
**ECPANTHERIA**, Hübner.  
*albicornis*, Grote.  
*cyaneicornis*, Grote.  
**EUPSEUDOSOMA**, Grote.  
*niveum*, Grote.  
 ? *Charidea? nivea*, H-S.  
**ROBINSONIA**, Grote.  
*formula*, Grote.  
**CARATHIS**, Grote.  
*gortynoides*, Grote.  
**AMMALO**, Walk.  
*impunctus*, Grote.  
**EUALISIDOTA**, Grote.  
*luxa*, Grote.

*fasciata*, Grote.  
*scripta*, Grote.  
*alternata*, Grote.  
**HALISIDOTA**, Hübn.  
*cinetipes*, Grote.  
*Hal. tessellaris*† Walk.  
*cubensis*, Grote.  
**WELPHE**, Boisd.  
*confinis*, H-S.  
**ERITHALES**, Poey.  
*guacolda*, Poey.  
**PARUCHETES**, Grote.  
*cadaverosa*, Grote.  
*affinis*, Grote.  
**DASYCHIRÆ.**  
**EUPROCTIS**, Hübn.  
*argentiflua*, Hübn.  
*pygmaea*, Grote.  
*fumosa*, Grote.  
**PHRYNE**, Grote.  
*immaculata*, Grote.  
**PSYCHIDÆ.**  
**THYRIDOPTERYX**, Steph.  
*thoracica*. (See note.)  
*Hymenopsyche thor.*, Grote.  
**OIKETICUS**, Guilding.  
*poeyi*, Lucas.  
**PSYCHONOCtua**, Grote.  
*personalis*, Grote.  
**PEROPHORA**, Harris.  
*packardii*, Grote.  
**PTILODONTES.**  
**EDEMA**, Walk.  
*insularis*, Grote.  
**HETEROCAMPA**, Doubleday.  
*cubana*, Grote.  
**HEPIALINÆ.**  
**COSSINI.**  
**XYLEUTES.**  
*piger*, Grote.

NOTE.—Since the presentation of this Paper, I have seen an article by Dr. Clemens, in which *Ceceticus coniferarum*, Harris, (Down. Hort. 8, 1853.) is referred as a synonym to *Thyridopteryx ephemeraformis*, Stephens. In this view of the case the genus *Hymenopsyche*, becomes synonymous with *Thyridopteryx*, and the species from Cuba will be called *Thyridopteryx thoracica* (*Hymenopsyche thoracicum*, Grote). Since, under the circumstances, my course in erecting the new genus was justifiable, and seems to be so regarded by Dr. Clemens, I



have little to add to the matter, except that I was then and am yet unacquainted with the species included under the *Thyridopteryx* by Dr. Packard in the "Synopsis." By actual comparison, through the kindness of Dr. Packard, I ascertained at the time the identity of *Eceticus coniferarum*, Harris, with a species occurring plentifully in New York. On a comparison of this species with the true *Eceticus* (*Oiketiscus*, *Guilding*.) from Cuba, I found the two forms to be generically distinct, so that, in noticing a new species congeneric with *O. coniferarum*, I very naturally erected a genus to contain the two species. Dr. Clemens, without examining specimens of *H. thoracicum* from Cuba, doubts the validity of the species, but, having examined and compared the two, I am decided that the much smaller and differently colored *T. thoracica*, is distinct. And I see nothing surprising in this circumstance, since the Cuban *Bombycidæ* are entirely distinct from our U. S. species of the Family with but one exception, and that—*Utetheisa bella*—one about which much remains to be ascertained. *Perophora*, another *Psychid* genus, is represented by a peculiar and amply distinct species—*P. packardii*, m.—the validity of which has been since supported by Dr. Herrich-Schaeffer, who has examined specimens of *P. packardii*, sent by Dr. Gundlach.

The remarks of Mr. Walsh on this subject in the November number of the "Practical Entomologist," have also been shown to me. I am sorry to see Mr. Walsh's statement that Dr. Clemens communicated to him by letter, that "Mr. Grote gave a third name to this same species, (i. e. *Thyr. ephemeraformis*, *Steph.*—*O. coniferarum*, Harris, teste Clem.)—*Hymenopsyche thoracicum*." In this case we have Dr. Clemens' own printed Paper to refer to, and can see, that Dr. Clemens merely *presumed*, or *suggested*, that the Cuban was not sufficiently distinct from the United States species; which latter I certainly never determined as "*Hymenopsyche thoracicum*," but, under Dr. Harris' specific name, simply referred the species to the same genus with *H. thoracicum*, as above explained. With this reference Dr. Clemens does not find fault, rather the reverse, since he says I "very properly" changed the generic determination of *Eceticus coniferarum* of Drs. Harris and Packard. Under the circumstances also, that "Stephens' specimen was doubtless nearly or quite denuded, the antennæ were injured and the hind wings were almost entirely destroyed," much might be properly urged to support both my genus and Dr. Harris' species, although, it is added, that "Stephens' generic description is sufficiently graphic, together with the description and figure given, to identify it at once with *Hymenopsyche* of Grote." The generic characters given by Stephens, become much less trenchant when the species afterwards described and figured by Westwood under *Oiketiscus*, and subsequently partially separated under distinct genera by Mr. Walker, are considered; indeed, on comparing all these generic diagnoses in the British Museum Lists, I considered at the time, that our United States form had been hitherto unnoticed by Authors, and I was strengthened in my belief by Dr. Harris' reference of the species to *Eceticus*. Under these impressions I was careful to give a detailed description of the structural characters of our species, and in particular I endeavored to bring out the neuronal features, which seemed to be peculiar, and I am happy to see my generic diagnosis commended in this respect by Dr. Clemens, so that I am not unreasonable in supposing my determination to have been of some assistance in the matter. Leaving, however, the case as satisfactorily settled by Dr. Clemens, I desire to notice Mr. Walsh's remarks briefly in conclusion. Considering on what extraordinary grounds Mr. Walsh has separated certain of our *Lepidoptera* as distinct species, the remarks of this gentleman come with peculiar bad grace when they take the

direction of an admonishment to others to exercise care in scientific discriminations. The species which I allude to as improperly separated by Mr. Walsh, are as follows:—*Halesidota antiphola*, Walsh (=Hal. tessellaris, Smith sp., described "long after" Smith's "time"); *Halesidota harrisii*, Walsh (=Halis. tessellaris, Walsh, non Smith sp., apud Walsh, but in reality identical, inasmuch as the imagoes are undistinguishable, and if you rear the moths from larvæ with "black" thoracic tufts, you have one, if from larvæ with "orange-colored" thoracic tufts, you have the other of these so-called "*species*," which Mr. W. has "shown" to be "absolutely undistinguishable" in the imago state, and yet has separated as distinct species, "in process," too, "of formation"); *Sphingicampa* (n. gen.) *distigma*, Walsh (=Dryocampa bicolor, Harris, Walsh). It is, in fact, no less a person than Mr. Walsh himself, who, in describing the above-mentioned species of *Halesidota*, has turned "varieties" into "species," and who, when erecting the genus *Sphingicampa*, manufactured actually two "genera" out of one "species." That it was in an attempt to palm off the Darwinian theory upon Entomologists, that the above errors were committed, and that the detection of these mistakes recoils upon that theory through its ill advised supporter, will be the only gratifying features attending these synonyms to those scientists, who have been led through their studies to reject the Developmental theory of Creation. But Mr. Walsh's critical insinuations in the article here alluded to, are not palliatives for his own short comings, however much he may have desired they should be, while in order to make as much of them as possible. Mr. Walsh has allowed himself to distort the true facts of the case, which are these: Dr. Packard cited Harris's MS. determination of the species, and so cannot be said to have "named" it, and I, as stated above, never described "this same species" as "*Hymenopsyche thoracicum*," neither did Dr. Clemens charge me with doing so, Mr. Walsh, in all these instances, to the contrary notwithstanding.

However, the position of Mr. Walsh, with regard to the validity of the above cited genera and species and to the success of the "Entomological speculation" dependent on that validity, may be compared with that of Menecrates in the matter of bee-bread, a substance which was held by this Ancient to be a flower. Pliny (Hist. Nat. Lib. XI, c. 7), in recording this opinion of Menecrates, somewhat summarily disposed of both it and its Author, in adding: "but no one says so but him." Were Mr. Walsh's *Dryocampa bicolor*, and *Sphingicampa distigma*, really and in fact distinct forms, it would appear that an important weapon were thereby placed in the hands of the Derivatists. But, since the statement of such distinctiveness is the result of erroneous assumption and supposition, the supposed species may be considered as a sort of entomological Professor Teufels-dröckh of Weissnichtwo, or Mrs. Harris. One of Mr. Walsh's Papers, that on Phytophagic Varieties and Phytophagic Species, contains erroneous statements which inferentially tell against the value of Mr. Walsh's evidence in such matters. For instance, a point is made by the statement that *Tropæa luna*, feeds only on "walnut and hickory," which is incorrect, since this species feeds commonly in certain localities, on the gum, *L. styraciflua*. In Putnam County, N. Y., last October, Mr. Robinson and myself, while "chestnutting," knocked a full-grown larva of *T. luna*, from the branches of a chestnut tree standing by itself in an open field; so that the "chestnut" is also a food-plant of this species. *Platysamia cecropia*, feeds on an immense variety of trees and shrubs of both native and foreign origin. In fact our Attaci, a sub-family of typical Bombycidæ, are essentially polyphagic,

and, as a whole, this habit is characteristic of the entire Family. The *Dryocampini* do not feed on oaks to the extent that they may be called querciphagic; *Anisota* (*Dryocampa*, Harris) is found also on Pines on which *Citheronia sepulchralis* feeds, while its congener, *C. regalis*, feeds on plants as botanically dissimilar as *Cephalanthus occidentalis* and the different species of *Carya*. *Eacles imperialis*, has been several times taken by me on the horse-chestnut, a tree of European origin. We owe perhaps, the creation of the new genus and species by Mr. Walsh, to the circumstance that the problematical larva, (*D. bicolor*, *Walsh*) was found on oak, and hence, according to Mr. W.'s reasoning, must be a *Dryocampa*, and being *Dryocampa*, must have simple antennæ in the ♀. In these same Papers, the narrative of Mr. Walsh's breeding experiments with *Halisidota* larvæ is a perfect farce, and makes the subject unnecessarily ridiculous. If it shows anything, beyond the style of Mr. Walsh's breeding-cages, it is, that certain Lepidoptera, when in a half-grown larval state, cannot be changed from their original food-plant with perfect impunity—a fact which has been known for some time—and that *Halisidota tessellaris* is one of these. Sweeping statements should not be made from the results of any single isolated personal experience, and in future, Mr. Walsh would do well to consult additional evidence and to repeat his experiments before venturing on wholesale assertions, on the accuracy of which much depends. It is true, that where evidence is offered by other parties, Mr. Walsh has a cool way of rejecting it, where such rejection suits his purposes, as in the instance of Mr. Ridings' testimony as to the existence of intermediary (♀) individuals between *P. turnus* and var. *glaucus*. That these exist, is a notorious fact; such an one has been long ago figured by Esper, and a number of intermediary (♀) individuals, with the wings more or less sprinkled with yellow scales, have occurred to me in New York State. One taken by Mr. Ridings in Georgia, shows irregular patches of yellow scales on the upper surface of primaries. The geographical limits assigned by Mr. Walsh to the melanitic form, *glaucus*, are also not strictly correct. Again, the manner in which Dr. Harris' description of the larva of *H. tessellaris*, is accounted for, in the Paper before alluded to, is an illustration of another method of treatment which direct evidence, where such conflicts with his theories, receives at the hands of Mr. Walsh, who has not been stopped in this instance by Dr. Harris' known reputation for accuracy as an Entomological observer, but has carried his remarks to the verge of unjustifiable aspersion. While thus, on the one hand, *positive* evidence is overlooked or distorted by Mr. Walsh, *negative* evidence is at times accorded undue weight by him. So, because *Leucania unipuncta*, is omitted in a book on the Insects injurious to Vegetation in the Eastern States, the species is boldly stated not to occur there, (a manner of proving an *alibi*, which would at least be a novel one in a Court of Justice,) and a problematical larva is *determined* as that of *Dryocampa bicolor* by the "process of exhaustion." A proper redress of the wrongs which Lepidopterological Science has received at the hands of Mr. Walsh, has not been offered, and is, perhaps, not to be expected from him—*Nescio quo fato res mala facta bona est.*

## Descriptions of new species of North American FORMICIDÆ.

BY S. B. BUCKLEY.

[Continued from page 172.]

37. *Odontomachus texana*, n. sp.

*Worker.* Length 0.39 inch. Head, thorax and legs reddish-brown; abdomen black or bronze; head oblong, and widest anteriorly; eyes small, black, subelliptical; antennæ filiform and inserted in front; two prominent ridges commence near the base of the antennæ and diverge forwards on each side of the epistoma, a channel extends back from the mandibles, on each side between the eyes, to a little beyond the middle of the head, where they form one channel which extends back, dividing the occiput into two rounded lobes; under surface of the head depressed and flattened between its outer margins; mandibles long and projected straight in front, being curved near their ends, and having two sharp teeth on each inner margin, at apex, the inner margins are also crenate or serrated with short blunt teeth; thorax long, large, and but little narrower than the head; prothorax short and rounded above; mesothorax largest and raised highest, with a small circular elevation on its posterior margin; metathorax also larger than the prothorax; the whole compressed, lateral, and with the divisions well marked; pedicle short; scale large, erect; wedge-shaped and pointed; abdomen oblong-ovate, acute; legs long, slender, and of a lighter color than the thorax and head.

Has cells beneath rocks, in Northern Texas.

38. *Myrmica rubra*, n. sp.

*Worker.* Length 0.19 inch.—Reddish brown, legs and under surface of a lighter shade; head subquadrate, with its sides a little rounded, oval above; occiput emarginate, its posterior angles not rounded; antennæ inserted at the base of the clypeus, approximate, short, clavate; a short ridge midway between bases of the antennæ; eyes minute, and like ocelli, placed on the upper sides a little back of the middle of the head, circular; under surface of the head rounded, smooth, with a deep concavity beneath the occiput; mandibles of medium size, curved inwards and downwards, toothed at their apices, enlarged anteriorly; prothorax  $\frac{1}{2}$ — $\frac{1}{3}$  less in width than the head, oblong, sub-compressed at the sides, rounded above; mesothorax depressed with a slight strangulation between it and the metathorax; metathorax descends gradually to the pedicle; nodes large, rounded and narrowed anteriorly, posterior one the largest; abdomen small, ovate; legs

long; coxæ and trochanters large; upper surface of head, thorax and abdomen thinly sprinkled with hairs.

Dwells in the ground near the surface, in McCulloch County, in Western Texas.

39. *Myrmica subrubra*, n. sp.

*Worker*. Length 0.18 inch.—Reddish brown, abdomen paler, smooth and shining; head ovate, rounded above, at sides and behind; antennæ inserted near the base of the clypeus, hairy, long, filiform, and but little enlarged towards their apical joints; eyes small, circular, lateral and midway; mandibles small, curved inwards and downwards, acute; prothorax narrower than the head, rounded above, at the sides, widest posteriorly; mesothorax depressed, inclined back, with a well marked division between it and the metathorax; metathorax has two large divergent spines, somewhat inclined posteriorly; pedicle long; scales nearly equal, anterior one smallest and somewhat wedge-shaped; abdomen ovate, subacute; legs long, slender.

*Female*. Length 0.18 inch.—Black; legs hyaline; head small; eyes large, prominent, lateral, and placed in front of the middle; club of the antennæ very short; flagellum slightly enlarged about its middle, then somewhat attenuated; mandibles hyaline; prothorax wider than the head; mesothorax not depressed, the whole thorax from the middle of the prothorax somewhat compressed, narrowed posteriorly; on the lower part of the metathorax are two short spines; scales nodose, about equal; wings extend beyond abdomen 0.10 inch; otherwise like the worker.

Winged females obtained in August, under the bark of a decayed tree, near Washington, D. C., and also at Aquia, in Virginia.

Quick in its movements.

40. *Myrmica californica*, n. sp.

*Worker*. Length 0.25 inch.—Reddish-brown or yellowish-red; head subquadrangular, rounded above; occiput slightly emarginate; eyes small, circular, lateral, placed about midway of the head; antennæ short, clavate, inserted at the base of the clypeus; mandibles large, widened in front, curved inwards and downwards, 7-toothed on the inner margin; head not channeled below; upper surface finely longitudinally striated; prothorax narrower than the head, rounded above, at the sides, and widest about the middle, divisions of the thorax not strongly marked; mesothorax subcompressed at the sides, as high as the prothorax, but not as wide; metathorax rounded above, sloping gradually to the pedicle; whole thorax transversely striated; pedicle

long, nodes rounded, anterior one smallest; abdomen round-ovate, sub-obtuse, smaller than the head; legs long, slender; whole ant rather thickly sprinkled with short, white hairs.

California (Xantus). From the Collection of the Acad. Nat. Sciences, Philadelphia.

41. *Myrmica nova eboracensis*, n. sp.

*Female*. Length 0.29 inch.—Head, thorax and abdomen piceous, with dark shades of reddish-brown on the pedicle, scales and legs; head broad-ovate, rounded above, at the sides and posterior angles; eyes small, circular, lateral, placed about midway of the head; antennæ inserted on the sides of the clypeus, short, clavate; ocelli 3, placed on vertex of occiput; mandibles small, reddish-brown, subtriangular, toothed on their inner margins, which are tinged with black; head a little wider than the prothorax; prothorax rounded in front, above, and slightly so at the sides; mesothorax larger, rounded, and above the pro- or metathorax; metathorax small, truncate, with two small spines near its posterior base; pedicle short; scales small, nodose, nearly equal; abdomen broad-ovate, subtruncate in front; legs short, slender; whole ant of a compact, robust form, and thickly sprinkled with short hairs. Wings extend about a line beyond the abdomen.

*Hab*.—New York. (Norton).

42. *Myrmica (Monomarium) diversa*, n. sp.

*Female*. Length 0.27 inch.—Color, honey-yellow, or yellowish-brown; wings project beyond the abdomen; head triangular, rounded above; ocelli present in a triangle on the top of the head, a little back of the vertex; mandibles triangular, short, large, curved inwards and downwards, posterior angles of occiput slightly rounded, and occiput not emarginate, but nearly straight; antennæ short, and somewhat enlarged towards the apical joint; eyes small, circular, lateral, and placed in front of the middle part of the head; the central part of the under surface of the head nearly flat, concave before and behind; prothorax about equal in width to the head, large, rounded, raised above the mesothorax; mesothorax small, not depressed; metathorax short and steep posteriorly, with two small spines; pedicle of medium length; scales rounded, posterior one the largest; abdomen oblong-ovate.

*Worker major*. Length 0.22 inch.—Head, legs and thorax reddish brown; abdomen piceous; head large, oblong, with its sides nearly parallel, and varying much in size; a longitudinal channel extends from the clypeus over the top of the head to the base of occiput; occiput deeply emarginate, posterior lobes of the head rounded; eyes

small, circular, lateral and placed about midway of the head; antennæ long and enlarged anteriorly; mandibles large, triangular, curved inward, and with two sharp teeth at the apex; head not grooved, and but slightly depressed below near the middle, and concave beneath the occiput; prothorax small, much narrower than the head, compressed and irregular in outline; divisions of the thorax strongly marked or strangled; mesothorax rounded and raised to a point in the middle; the metathorax has two short spines; scales of the pedicle sub-equal and jagged; abdomen smaller than the head, ovate.

*Worker minor.* Length 0.13 inch.—Head and abdomen piceous; thorax and legs yellowish-brown; head small, sub-triangular, rounded above and flattened below; eyes large, lateral, and placed a little in front of the middle part of the head; prothorax narrower than the head, rounded and smooth above; legs long, slender; otherwise like the larger worker.

*Hab.*—Central Texas. Common. It has dwellings in the ground, twelve to eighteen inches beneath the surface, sometimes beneath stones and sometimes in open spaces, throwing the excavated dirt, without order, over the surface. The larger workers seem to do little, being seldom seen in the open air, nor do they assist in conveying the larvæ to a place of safety when their abodes are uncovered. They are much less active than the smaller workers.

43. *Myrmica (Monomarium) minima*, n. sp.

*Female.* Length 0.22 inch.—Color jet-black, the whole body smooth and shining; legs and margins of the segments of the abdomen brownish-black, or subhyaline; head triangular, rounded above; occiput not emarginate, the posterior angles rounded and of about the same width as the thorax; mandibles small, curved, acute and triangular; eyes small, circular, lateral, and placed about midway of the head; antennæ long, filiform, and enlarged anteriorly; thorax with its sides compressed, the divisions but slightly marked; mesothorax the highest; scales large, the front one slightly compressed, inclined forwards, and subacute, the other rounded; abdomen large, ovate, oblong, upper surface of the body and head sprinkled with a few gray hairs; slender in outline.

*Worker.* Length 0.06 inch.—Black; head wider than the thorax; pedicle long; abdomen but little larger than the head, ovate and acute; otherwise like the female.

Lives under stones and beneath the bark of decaying trees. It also excavates into the ground, but two or three inches below the surface.

Common in Central Texas, where it is often seen going in ranks on the ground or trees. It is rather slow in its movements.

44. *Myrmica (Monomarium) coeca*, n. sp.

Length 0.12 inch.—Reddish-brown; head subtriangular, smooth and oval above, a little rounded below, beneath the vertex, concave beneath the occiput; mandibles small, curved inwards and downwards, acute and brownish-black; eyes none; antennæ 12-jointed, rather short, and inserted on the front of the head near the clypeus, slightly enlarged towards the apex; prothorax nearly equal in width with the head, smooth and oval above and forwards, and narrowed posteriorly; mesothorax somewhat depressed; metathorax raised posteriorly, thence descending abruptly to the pedicle; nodes of the pedicle large, of about equal size and somewhat rounded; abdomen small, oval, and but little larger than the head; legs long and slender.

Has cells beneath rocks, in San Saba County, Texas.

45. *Myrmica (Monomarium) marylandica*, n. sp.

*Worker.* Length 0.12 inch.—Abdomen black or piceous, the rest yellowish-red; head round-ovate, rounded above; antennæ inserted at base of the clypeus; club and flagellum of about equal length, the latter largely clavate; eyes small, circular, lateral, and but a little back of the middle; mandibles small, curved in and toothed; prothorax  $\frac{1}{2}$  narrower than the head, rounded somewhat at the sides, flattened above, widest in front; mesothorax small, depressed above and compressed at the sides; metathorax subquadrate, with two large divergent spines inclined back; pedicle incrassate, and inserted in the upper anterior part of the abdomen; scales small, nodose, and subemarginate above, nearly equal; abdomen subtriangular, acute; legs long, slender; the whole ant rather thickly sprinkled with hairs. It often carries its abdomen turned up erect.

Beneath stones, and also on the trees, near Washington, D. C., and also in Maryland, in the Druid Hill Park, Baltimore.

46. *Myrmica (Monomarium) montana*, n. sp.

*Worker.* Length 0.14 inch.—Head, thorax and abdomen dark reddish-brown, under surface spotted with pale yellow; legs pale yellow; antennæ yellowish-red; head ovate, rounded above, occiput not emarginate; antennæ clavate, inserted near the base of the clypeus; eyes very small, circular, lateral, placed about midway of the head; mandibles small, widened anteriorly, curved in and toothed on their inner margins; upper surface of the head longitudinally striated, striæ numerous; under surface not channeled; prothorax  $\frac{1}{2}$  narrower than



the head, somewhat compressed, widest in front, a little flattened above; mesothorax not depressed, narrower than the pro- or metathorax; metathorax has two short spines on its upper posterior surface, from which it is steep to the pedicle, subpunctate near its base; scales large, anterior one somewhat wedge-shaped and obtuse, posterior one nodose; abdomen smooth, shining, ovate, subtruncate in front, obtuse behind; legs long, slender; upper surface of head, thorax and abdomen thinly sprinkled with white hairs.

On hills, beneath rocks, near Austin, Texas.

47. *Myrmica* (*Monomarium*) *lineolata*, n. sp.

*Worker*. Length 0.17 inch.—Head, thorax and abdomen piceous, varied with dark reddish-brown spots; legs, antennæ and mandibles reddish-brown; head subquadrate, with its sides nearly parallel, round above, posterior angles rounded; antennæ inserted on the sides of the clypeus, short, clavate; mandibles curved in and downwards, toothed on their inner margins; eyes small, circular, lateral, placed about midway of the head; prothorax narrower than the head, round above, at sides and in front, widest in the middle; mesothorax not depressed, its sides compressed, a little narrower than the pro- or metathorax; metathorax with its sides a little rounded, and with two spines on its upper posterior part, diverging and inclined back a little, subtruncate; scales large, nodose, front one a little the smallest; abdomen round-ovate, subobtuse; upper surface of head and thorax finely and longitudinally striated; striæ rough and finely granulated; abdomen smooth; legs long, slender; head, thorax and abdomen thickly sprinkled with short hairs.

*Female*. Length 0.24 inch.—Head ovate, round above, at the sides and posteriorly; eyes large, prominent; mesothorax about the same width as the prothorax; abdomen broad, round-ovate; otherwise like the worker.

48. *Myrmica* (*Monomarium*) *columbiana*, n. sp.

*Female*. Length 0.39 inch.—Black; pedicle, antennæ, nodes and legs piceous; margins of the segments of the abdomen hyaline; head subovate, rounded above, posterior angles rounded, not emarginate; ocelli placed near and back of the vertex; eyes large, subelliptical, lateral, placed about midway; antennæ inserted at the base of the clypeus, short, clavate; mandibles reddish-brown, short, triangular and finely toothed on their inner margins; prothorax about equal in width to the head, rounded above, in front and at the sides, widest in the middle; mesothorax small, narrowed back and not depressed; me-

tathorax below the mesothorax, truncate, two short spines project back from its upper surface; scales nodose, subequal; abdomen oblong-ovate, subacute; legs short, slender; wings extend beyond the abdomen 0.13 inch; whole ant rather thickly sprinkled with short, minute, gray hairs.

*Worker.* Length 0.12 inch.—Eyes small, circular; occiput slightly emarginate; head wider than the prothorax; mesothorax slightly depressed, and a small strangulation between it and the metathorax, on the posterior surface of which are two large spines projecting back; pedicle short; scales nodose, posterior one largest; abdomen triangular, acute; otherwise like the female.

In the ground beneath stones, near Columbia College, Washington, D. C.

49. *Myrmica* (*Monomarium*) *aquia*, n. sp.

*Worker.* Length 0.22 inch.—Abdomen piceous, the rest yellowish-red, or reddish-brown; head ovate, rounded above; eyes small, circular, lateral, placed about midway of the head; antennæ at the sides of the clypeus, long, clavate; mandibles small, subtriangular towards the apex, curved inwards and downwards near their apices, toothed; prothorax narrower than the head, rounded above, in front, at the sides, enlarged posteriorly; mesothorax depressed and strangulated at its junction with the metathorax; metathorax raised a little, elongated, with two small spines on its posterior upper surface, which are a little inclined posteriorly; pedicle long; scales nodose, the anterior one somewhat wedge-shaped, and smallest; abdomen round-ovate, scarcely larger than the head; legs long, slender; upper surface of the head, thorax and abdomen thickly sprinkled with hairs; of slender form throughout.

*Female.* Length 0.26 inch.—Reddish brown, abdomen piceous; eyes large; ocelli 3, placed a little back of the vertex; wings extend 0.12 inch beyond the abdomen; prothorax  $\frac{1}{2}$  wider than the head, somewhat compressed at the sides and flattened at the top; mesothorax not depressed, of nearly equal width to the prothorax; metathorax inclined gradually to the pedicle, with two short spines near its centre; posterior scale nearly twice the size of the anterior; abdomen oblong-ovate; otherwise like the worker.

In the ground, at Aquia, Va., and also in Western New York.

50. *Myrmica* (*Monomarium*) *saxicola*, n. sp.

Length 0.12 inch.—Yellowish-brown, legs and whole surface beneath honey-yellow; head quadrate, rounded above, and posterior

angles rounded, sides nearly parallel; eyes lateral, black, small, circular, placed about midway of the head; antennæ short, clavate, head slightly channeled below, a small depression beneath the occiput; mandibles small, subtriangular, curved inwards, sharp-pointed, inner margins toothed; prothorax small, narrower than the head, rounded above; mesothorax depressed and sub-strangulated at its junction with the metathorax; metathorax large, sloping gradually to the pedicle, smooth and oval above; scales large, nearly equal, rounded; abdomen ovate, subacute; legs long, slender; whole ant smooth.

Beneath rocks, in Buchanan County, Texas.

51. *Myrmica* (*Monomarium*) *atra*, n. sp.

*Worker*. Length 0.15 inch.—Jet black, smooth and shining; tibiæ and tarsi subhyaline; head ovate, round above, at the sides and posterior angles; eyes small, circular, prominent, lateral, in front of the middle; antennæ clavate, at base of the clypeus; mandibles small, curved inwards and downwards, acute, head not channeled below; prothorax a little wider than the head, rounded above, and slightly at the sides; the divisions of the thorax slightly marked, being widest at the mesothorax, and gradually narrowed back; metathorax slightly depressed, subtruncate; pedicle long; scales subnodose, anterior one small and sub-wedge-shaped; abdomen large, ovate, oblong, subobtuse; legs short, slender; the whole ant smooth and without hairs.

On trees, near Georgetown, D. C. Rare.

52. *Myrmica* (*Tetramorium*) *exigua*, n. sp.

*Female*. Length 0.16 inch.—Black or piceous, legs dark-brown or hyaline; head very small, broad-ovate, somewhat rounded above and behind; antennæ clavate, long, filiform, at base of the clypeus; eyes very large, prominent, subelliptical, lateral, and placed in front of the middle; mandibles small, curved inwards, acute; ocelli at the top of the occiput; prothorax large, wider than the head, rounded above and below, and slightly at the sides, larger than both meso- and metathorax; mesothorax not depressed, somewhat rounded above; metathorax depressed, subtruncate; pedicle long; scales small, nodose, posterior one the largest; abdomen ovate, narrowed before and back, widest in the middle; legs short, slender; smooth throughout.

*Worker*. Length 0.06 inch.—Pale-yellow, upper surface of the head yellowish-brown; head oblong-ovate, rounded above and slightly so at the sides, widest in the middle, divisions of the thorax well marked; mesothorax rounded above, and also the metathorax, which descends gradually to the pedicle; scales nodose, anterior one largest; abdomen small; otherwise like the female.

Beneath stones, in the vicinity of Washington, D. C. Winged females caught in July.

53. *Myrmica (Diplorhoptrum) scabrata*, n. sp.

*Worker.* Length 0.29 inch.—Legs, antennæ, pedicle, scale, mouth, and under surface of the two last segments of the abdomen yellowish-red, the rest black; head ovate, rounded above, at sides and occiput; eyes none; antennæ short, much enlarged towards their apical joints; mandibles widened anteriorly, toothed on their inner margins, small; prothorax about  $\frac{1}{2}$  narrower than the head, rounded at sides and somewhat flattened at the top, widest in front; mesothorax not depressed, narrower than the prothorax; metathorax narrowed back, with two spines on its posterior upper surface, truncate; scales small, subnodose, back one largest; abdomen large, oblong-ovate; upper surface of the head and thorax rugose and striated; abdomen smooth; legs long, slender; head, thorax and abdomen thickly sprinkled with short hairs.

*Hab.*—Connecticut, (Norton).

54. *Myrmica (Atta) sabeana*, n. sp.

*Worker.* Length 0.20 inch.—Reddish-brown or brownish black, the upper surface of the head, thorax and abdomen piceous or blackish brown; head subquadrate, and emarginate at the occiput, channeled slightly below; mandibles small, curved inwards, with two or three small, sharp teeth near the apex, inner margins of the mandibles piceous; antennæ clavate, inserted in front; joint very short, excepting the apical, which is long; eyes small, circular, black, lateral and a little in front of the middle part of the head; prothorax narrower than the head, and not compressed; mesothorax somewhat depressed; metathorax small, rounded and smooth, pedicle long; scales nodose and of nearly equal size; abdomen ovate, legs long and slender; whole ant sparingly sprinkled with gray hairs. Workers variable in size, but not in shape; the length of the largest is given.

In the ground, about the roots of tufts of grass, throwing its excavated dirt above without order. Near the ford of the San Saba river, in Mason County, Western Texas.

55. *Myrmica (Atta) sublanuginosa* n. sp.

*Worker.* Length 0.16 inch.—Color roddish-brown; head subquadrate, rounded above, occiput emarginate; eyes circular, black, small, lateral, and about midway of the head; antennæ inserted in front, 12-jointed, joints short and enlarged anteriorly; mandibles small, triangular, curved inwards, toothed and acute; prothorax about half the width

of the head; mesothorax depressed, with a strangulation between it and the metathorax; metathorax has two small spines; pedicle long, scales large, nodose, the posterior one largest; abdomen ovate; legs long, slender; whole body moderately clothed with soft short hairs.

Beneath rocks in San Saba County, Texas.

56. *Atta Lineecumii*, n. sp.

Length 0.24 inch.—Smooth throughout and sparingly sprinkled with hairs, reddish brown; head subcordate, rounded above, occiput emarginate; 3 ocelli on top of the occiput; eyes black, large, circular, lateral, and in front of the middle; antennæ at base of the clypeus, short, clavate, head sinuate beneath; mandibles small, curved inwards and of nearly uniform size throughout, toothed at their extremities; prothorax nearly as wide as the head, rounded above, at its sides, widest in the middle; divisions of the thorax well marked; mesothorax not depressed, rounded up in the middle, a brownish-black raised border on its sides and between it and the metathorax; metathorax narrowed back, spineless; pedicle long; nodes nearly equal, wedge-shaped; abdomen ovate-oblong; legs rather short, slender, wings not seen.

*Worker major*. Length 0.13 inch.—Reddish-yellow; abdomen brownish-black; eyes small, circular, lateral and in front of the middle; thorax about  $\frac{1}{2}$  the width of the head, smooth, somewhat rounded above and narrowed back; mesothorax depressed posteriorly, strangled at its junction with the metathorax; nodes slightly wedge-shaped; abdomen small, round-ovate, and rather thickly sprinkled with hairs; legs long, slender. The rest like the female.

*Worker minor*. Length 0.10 inch.—Occiput rounded posteriorly, a deep strangulation at the mesothorax; metathorax small, nodose, whole ant slender. Otherwise like the worker major.

Has cells in the ground 2—3 feet deep, throwing the excavated dirt without order at the surface. Is active and warlike.

*Hab.*—Central Texas, near streams.

57. *Atta picea*, n. sp.

*Worker major*. Length 0.12 inch.—Black or piceous; head quadrangular, rounded above; occiput emarginate, posterior angles rounded; antennæ at the base of the clypeus, short clavate; eyes small, circular, in front near the bases of the antennæ, sublateral; mandibles small, slender, curved inwards, acute; prothorax narrower than the head, rounded above, in front where it is widest; mesothorax slightly depressed and rounded above; metathorax has two prominent spines,

erect and diverging, pedicle long, anterior one wedge-shaped, posterior one nodose; abdomen ovate, obtuse; legs long, slender; abdomen and the whole upper surface of the body thickly sprinkled with long hairs.

*Worker minor.* Length 0.08 inch.—Head ovate, rounded above, at the sides and posterior angles; not emarginate, antennæ long filliform, clavate; tarsi hyaline; very slender throughout, and less hairy than worker major; otherwise like the worker major.

Beneath stones near Austin, Texas.

58. *Atta brasiliensis*, n. sp.

*Worker major.* Length 0.21 inch.—Head, thorax and legs reddish-brown; abdomen piceous; head broad-ovate, round above, sides and posterior angles rounded, occiput slightly emarginate; eyes small, lateral, circular, about midway of the head; antennæ short clavate, at the base of the clypeus; mandibles small, curved inwards and downwards, slightly enlarged in front, toothed; prothorax  $\frac{1}{2}$  less width than the head, rounded in front, at the sides, and but little above, widest in the middle; mesothorax a continuation of the prothorax, narrowed back to the metathorax, which is depressed and slightly rounded above, and at the sides, subtruncate; pedicle long; front scale smallest and sub-wedge-shaped; posterior one nodose; abdomen large, oblong-ovate; legs slender; upper surface of head, thorax and abdomen thickly sprinkled with hairs.

*Worker minor.* Length 0.12 inch.—Head sub-ovate, its sides nearly parallel, not emarginate, slightly channeled below,  $\frac{1}{2}$  wider than the prothorax; abdomen small, ovate; legs long, slender; otherwise like the worker major.

Dwells in the ground in Northern Texas near the Brazos river.

59. *Atta pennsylvanica*, n. sp.

*Worker major.* Length 0.23 inch.—Abdomen piceous, the rest reddish-yellow or pale yellow; head ovate, its posterior angles and upper surface rounded, slightly emarginate; antennæ short, the two apical joints much enlarged; eyes small, circular, lateral, and a little in front of the middle, two small ridges are on each side of the epistoma extending nearly back to the vertex; mandibles small, curved inwards, acute; prothorax about  $\frac{1}{2}$  the width of the head, rounded laterally, widest in front of the middle; mesothorax depressed, sub-strangulated; metathorax rounded above, at its sides, and gradually sloping to the pedicle; pedicle long; nodes subequal, front one smallest and sub-wedge-shaped; abdomen oblong-ovate; legs long, slender; whole ant smooth and not hairy.

*Worker minor.* Length 0.13 inch.—Differs little from worker major, except in size; the small workers are the most numerous.

Beneath stones in the vicinity of Philadelphia.

60. *Atta coloradensis*, n. sp.

*Worker major.* Length 0.23 inch.—Reddish-brown; abdomen piceous and sometimes part of the upper surface of the head and thorax; head large, subquadrate, posterior angles rounded, a channel extends from the base of the clypeus over the top of the head to the base of the occiput, which is emarginate; eyes small, circular, lateral, about midway of the head; antennæ near the base of the clypeus; short, clavate; mandibles brownish-black, short, small, curved inwards, acute; under surface of the head not channeled; prothorax  $\frac{1}{2}$  narrower than the head, rounded at sides and above; mesothorax depressed a little, a slight strangulation between it and the metathorax; metathorax rounded above and at the sides, and slopes gradually to the pedicle which is long; front scale sub-wedge-shaped and smallest, posterior one nodose; abdomen ovate; legs long, slender, whole surface sprinkled with gray hairs and rather smooth and shining.

*Worker minor.* Length 0.13 inch.—Whole upper surface piceous or black, tibiæ, tarsi and under surface of thorax pale yellow, under surface of head and abdomen piceous tinged with pale yellow or reddish-brown; head ovate, smooth, and rounded above, not emarginate; smooth and shining throughout, with few or no hairs; otherwise like the worker major.

Dwells in the ground near the Colorado river in Northern Texas.

61. *Geodoma virginiana*, n. sp.

*Worker.* Length 0.11 inch.—Yellowish-red; head triangular, somewhat flattened above, its posterior angles not rounded and sides nearly straight; eyes rather large, black, prominent, lateral, and about midway of the head; mandibles sub-triangular, acute; antennæ short, apical joint long and enlarged; lateral margins of the head slightly raised and not rounded, under surface of head not channeled; occiput slightly emarginate; prothorax but little narrower than the head, with a short, rounded, spinose protuberance on each side; truncate in front and somewhat flattened above; mesothorax slightly narrowed and a depression between it and the metathorax; metathorax truncate and two-spined, the whole thorax robose and sub-spinose above; first much smallest, sub-conical, with a rudimentary spine; abdomen round-ovate; legs not slender.

Dwells in the ground on hills near Aquia in Virginia. Slow in its movements.

The following description of the "cutting ant," of Texas, is now given, because when an attempt was made by the writer to describe it in the proceedings of the Acad. Nat. Sciences of Philadelphia for 1860, p. 233, he was in Texas, without a knowledge of Entomology, and without books on the subject, consequently said description is very imperfect; nor would it have ever been attempted had he not wished to tell of the wonderful doings of this ant.

62. *Ecodoma texana*.

*Female*. Length 0.62 inch.—Color reddish-brown; head triangular, small, occiput truncate, and upper margin nearly straight, two-spined, 3 ocelli at top of occiput; eyes small, lateral, circular, and about midway of the head, antennæ inserted near the base of the clypeus, long, filiform, and slightly enlarged toward the apical joint; mandibles large, triangular, brownish-black and finely toothed on the inner margins, apical teeth long, curved inwards and acute; prothorax about  $\frac{1}{2}$  wider than the occiput, raised and rounded above and in front, and widest in the middle; mesothorax rounded above and subtruncate behind, a black narrow band extending around its margins; metathorax below mesothorax, and truncated and has four short spines, petiole short; front node smallest, truncated in front, has lateral spines, its upper surface scarcely raised above the enlarged petiole which connects it with the posterior node, which is large, broad longitudinally, a narrow depressed band separating it from the first segment of the abdomen; abdomen larger, broad-ovate, obtuse; legs slender and rather short; anterior wings extend about six lines beyond the abdomen, upper surface of head, thorax and abdomen thickly sprinkled with hairs.

*Male*. Length 0.54 inch.—Head very small; eyes large, circular and prominent, spines of metathorax wanting or rudimentary; abdomen ovate, wings extend about five lines beyond the abdomen; otherwise like the female.

*Worker major*. Length 0.28 inch.—Color like the female. Head large, cordate, deeply emarginate, posterior lobes rounded, a deep sinus extends to near the vertex, dividing the head posteriorly into 2 lobes; eyes small, circular and prominent; ocelli none; spines of the occiput near its base; prothorax about  $\frac{1}{2}$  the width of the head and its upper surface, 4-spined, the two front spines longest, and slightly inclined forward; mesothorax strangulated, upper surface of metathorax two-spined and spines inclined back; nodes sub-quadrangular, rough and warty above; posterior node longest, abdomen about  $\frac{1}{2}$  the size of the



head, round-ovate; legs long, slender; whole ant thickly sprinkled with hairs.

*Worker minor.* Length 0.12 inch.—Occiput 4-spined, ant rounded posteriorly, upper spines minute, pedicle long, scales small, sub-nodose, posterior one largest; abdomen smaller than the head, ovate; otherwise like the worker.

Central Texas. Common and well known as the Cutting Ant.

For the same reason the following ant, noticed in the same volume as the preceding at page 455, is here redescribed:

63. *Myrmica (Monomarium) molifaciens.*

*Female.* Length 0.48 inch.—Color reddish-brown; head sub-triangular, sides rounded and also rounded above and behind; ocelli 3, a little back of the vertex; antennæ rather short and filiform, not clavate; mandibles black or brownish-black, rounded in front, large, curved inwards and downwards, 7-toothed, apical tooth long and acute; head nearly as wide as long, sinuate beneath; eyes black, prominent, sub-elliptical, lateral, and about midway of head; prothorax about equal in width to the head, rounded above and in front, where is a small sub-circular protuberance, divided into two nearly equal parts by a slight longitudinal channel; mesothorax slightly raised above the prothorax; metathorax depressed and has two short spines, posterior scale largest, and both sub-nodose; pedicle long; abdomen ovate, sub-acute; legs slender; wings extend but little beyond the abdomen; head, thorax and posterior part of abdomen thickly sprinkled with hairs.

*Worker.* Length 0.28 inch.—Head triangular, slightly emarginate behind and wider than the prothorax; prothorax rounded and smooth above and in front, widest in the middle, the whole thorax compressed and narrowed back, its divisions obscure; metathorax has two prominent spines slightly inclined backwards, less hairy than the female; otherwise like the female.

Central Texas. Common; it is called the mound-building or stinging-ant; its excavated dirt being mound-like.

64. *Ecodoma pilosa*, n. sp.

*Worker.* Length 0.15 inch.—Reddish-brown; head sub-quadrate, rounded above, posterior angles of the occiput also rounded, with the intervening space slightly curved inwards as seen from above; eyes small, lateral, black, and about midway of the head; antennæ in front and enlarged towards the apical joint; under surface of the head concave before and behind and plane in the middle; mandibles short, flattened, and of nearly uniform width, being slightly narrowed in the

middle and curved inwards, with five teeth in the truncated inner apical margins; prothorax narrower than the head, compressed and rounded above; divisions of the thorax not strongly marked; metathorax has two short spines near its base; pedicle long; scales nodose, posterior one the largest; abdomen small, round-ovate; legs long and slender, the whole ant thickly sprinkled with short, gray hairs.

Is slow in its movements. Has homes in the ground in Northern Texas at a depth not known.

65. *Oecodoma tardigrada*, n. sp.

*Female.* Length 0.21 inch.—Widened and curved, narrowed anteriorly; inner margin of mandibles finely toothed; head about equal in width to the prothorax; ocelli near the vertex of the occiput; mesothorax higher than the prothorax; abdomen short, broad ovate; legs slender and short; wings extend nearly a line beyond the abdomen; the whole body finely corrugated, and thickly sprinkled with short hairs, and with fewer spines than the worker; otherwise like the worker.

*Male.* Length 0.17 inch.—Head small, narrower than the prothorax; eyes large, prominent in front, near the base of the mandibles, a slight depression between the meso- and metathorax: abdomen small, round-ovate; otherwise like the female.

*Worker.* Length 0.21 inch.—Chestnut-brown or reddish-brown; head subtriangular; occiput subemarginate; two carinæ diverge back from the clypeus to the occiput, the space between them being nearly in the same plane, and depressed backwards; flagellum of antennæ clavate, its joints short; eyes small, black, circular, and placed in the anterior part of the head; under surface of the head has a broad depression beneath the occiput; mandibles slender, curved inwards, sharp and toothless; thorax narrower than the head, corrugated and spinous, having eight or more short spines; mesothorax strangulated; pedicle long; scales nodose, posterior one the largest; abdomen sub-ovate, obtuse; legs long and slender; whole ant rough and corrugated.

Lives in the ground, descending to its cells, two or three feet beneath the surface, by a hole about half an inch in diameter. It has a vegetable paste in some of its chambers which is probably used as food during inclement weather. It is slow and deliberate in its movements, and throws the excavated dirt in the form of crater.

Dwells in Central Texas, and is not uncommon.

66. *Oecodoma (Atta) arborea*, n. sp.

*Worker.* Length 0.22 inch.—Head, thorax and legs reddish-brown; abdomen black; head sub-quadrate, with its sides slightly rounded;

occiput not emarginate. Head oval above, and concave beneath the occiput and back of the mentum to nearly the middle of the head; mandibles small, dark-brown, smooth, sub-triangular, curved inwards, and sharp-pointed; eyes circular, small, black, lateral, and about midway of the head; antennæ filiform, and inserted in front near the base of the mandibles; thorax slender; prothorax about half the width of the head, rounded above and in front; mesothorax small, depressed, rounded above, with a strangulation between it and the metathorax; on the back part of the metathorax are two straight spines inclined backwards; pedicle elongated; scales small, nodose, and of nearly equal size; abdomen triangular, smooth and shining, sub-acute; legs long; coxæ and trochanters large; has cells in the decayed parts of trees, and when disturbed often turns up its abdomen into a nearly vertical position; often seen going in ranks up and down trees.

*Female.* Varies in color, in some the whole body is black, excepting the abdomen, which is banded with yellowish-white on the margins of its segments; in others the head is of a pale yellow; head small, and narrower than the prothorax, subtriangular, and rounded above and behind; thorax large; prothorax raised above the head, the whole thorax compressed laterally and narrowed backwards, with its divisions strongly marked; abdomen large, ovate; wings not seen; otherwise like the worker.

Common in Central Texas.

67. *Oecodoma (Atta) bicolor*, n. sp.

Length 0.12 inch.—Head, thorax and legs chestnut-red; abdomen piceous or reddish brown, shaded more or less with black; head sub-triangular, rounded above, and emarginate behind; eyes small, circular, and situated about midway of the head on the upper margins of its sides; flagellum of the antennæ clavate and hairy, with its joints short, excepting the apical; mandibles small, triangular, curved inwards and acute; prothorax narrower than the head, compressed and rounded above; mesothorax small and depressed; two spines, short and inclined backwards on the metathorax; scales of the pedicle small, and irregularly nodose; abdomen ovate; abdomen and thorax sprinkled with a few hairs.

Dwells in the ground but a few inches beneath the surface in Northern Texas.

Descriptions of two new species of **TRIGONALYS**.

BY E. T. CRESSON.

***Trigonalys pulchellus*.**

*Male*.—Head black, polished, finely and rather sparsely punctured, except the middle of the front, which is rugose from the insertion of the antennæ to the ocelli; mandibles, except tips, clypeus, broad frontal orbits, cheeks and two small spots behind the ocelli, all white; palpi pale yellowish-white; antennæ as long as the body, moderately slender, much attenuated towards the tips, 27-jointed, black, with a broad white annulus covering part of the 8th, the 9—13, and part of the 14th joints. Thorax black, shining, densely and finely punctured, slightly pubescent; mesothorax with two very deep longitudinal furrows, slightly diverging on the scutellum, and also a shallow longitudinal furrow on each side over the tegulæ; a large oblong spot on each side of the prothorax anteriorly, and the lateral posterior margins of the same, ending in a spot beneath the tegulæ, a sublunate spot on the disk of the mesothorax, tegulæ, a spot behind the tegulæ, sides of the scutellum, post-scutellum, and a transverse spot on each side of it, a large quadrate spot on each side of the metathorax, as well as two spots on each extreme side of the same, parallel with the posterior coxæ, a large, subrhomboidal spot on each side of the pleura, between and a little above the insertion of the anterior and intermediate coxæ, and a rather large double spot beneath the insertion of the anterior wings, all white; scutellum prominent, closely punctured, and channeled down the middle; metathorax rugose, with transverse sinuous, well-defined carinæ. Wings entirely hyaline, slightly iridescent, nervures fuscous; second submarginal cell narrow, more than thrice longer than wide, and connected with the first discoidal cell by a short petiole; third submarginal cell subquadrate. Legs fulvous; coxæ and trochanters white; posterior tarsi whitish. Abdomen ovate, polished, flattened; first segment with a round, black spot at base, surrounded by a fulvous circle, posterior margin with a white oblique spot on each side; second segment fulvous, with a large, subquadrate, black spot on each side, and a transverse, lateral, white spot at tip; remaining segments black, stained with fulvous on the sides, the third, fourth and fifth segments each with a whitish lateral spot at tip; seventh segment very small; apex of abdomen pointed, but slightly incurved; venter simple, flattened, pearly-white, transversely stained with pale dusky; extreme tip dusky. Length  $4\frac{1}{2}$  lines; expanse of wings 9 lines.

*Hab.*—West Virginia, (Ridings. Coll. Ent. Soc. Phil.)

The shape of the abdomen of the specimen from which the above description was taken is entirely different from that given in the generic description of *Trigonalys*, (Westwood, Trans. Ent. Soc. Lond. iii. p. 270,) since it is depressed, and scarcely to be called convex, either above or beneath; it is inserted immediately above and between the posterior coxæ; the first segment is triangular, and about equal in length with the second; the third as wide as the second, and a little shorter; the fourth narrower and a little shorter than the third; the three following segments rapidly decreasing in size, and but slightly incurved, the three together forming a triangle; seventh segment very

small and subtruncate at tip. The apical margin of segments 2—6 is slightly emarginate in the middle. The ventral segments are entirely simple, and proportioned about the same as the dorsal segments, the terminal one pointed, and extending slightly beyond the tip of the upper segment. The legs are long and moderately slender; the posterior coxæ are large and elongate, extending almost to the tip of the second ventral segment.

***Trigonalys (Lycogaster) costalis.***

*Male*.—Black; head opaque, rather deeply and very densely punctured, clothed with a short, rather dense, pale pubescence, hoary in certain lights; the orbits, wider in front, a spot on each side of the clypeus—which is shining and feebly punctured—and upper margin of the mandibles extending downwards at the base of the teeth, yellow; palpi fuscous; antennæ brown, slender, about two-thirds as long as the body, 24-jointed, tip very slender. Thorax rugosely punctured, opaque, pubescent; mesothorax with two deeply impressed, longitudinal lines, converging on the scutellum; a short line on each side in front of the tegulæ, ending in a spot beneath the insertion of the anterior wings, two medial abbreviated lines on the mesothorax anteriorly, tegulæ, the scutellum, except a black line down the middle, the space on each side with a spot near the base of the wings, the postscutellum and a transverse line on each side, an oblique spot on each side of the metathorax at tip, a narrow, oblique, indistinct line on each side of the pleura, all yellow; metathorax finely rugose, except the sides at base, which are rough and carinated longitudinally. Wings hyaline, with a broad fuscous streak along the costa, nearly obsolete at the base of the wing, but becoming broader towards the tip; second submarginal cell narrow, more than twice longer than wide, sub-petiolated with the first discoidal cell; third submarginal subquadrate, longer than wide. Legs short; posterior coxæ short, scarcely attaining the middle of the first ventral segment; yellowish; femora, except base and tips, dark fuscous, the intermediate pair with an exterior yellowish streak; tips of posterior tibiæ and of all the tarsi, dusky. Abdomen short, ovate, convex, tip much incurved, pointed; black, shining, closely but finely punctured; apical margin of the very small basal segment, yellow, as well as the more broad posterior margins of the four following segments, much the broadest on the second; venter polished, the apical margin of the first segment narrowly yellow and interrupted in the middle; second segment very large and prominent, the tip produced and emarginate in the middle, the posterior margin with a broad yellow stripe on each side and a rounded spot of the same color on the disk. Length  $4\frac{1}{2}$  lines; expanse of wings  $8\frac{1}{2}$  lines.

*Hab.*—Mass., (Ridings. Coll. Ent. Soc. Phil.)

Should *Lycogaster* Shuckard, be established as a valid genus, this species, as well as *Trigonalys Gundlachii* Cresson, from Cuba, should be classed as members of that genus. I have not yet seen a *Trigonalys* ♀, but judging from the great structural differences between the two ♂ specimens described above, I am inclined to believe that *Lycogaster* is a distinct genus.

Revision of the FOSSORIAL HYMENOPTERA of North America.

I. CRABRONIDÆ AND NYSSONIDÆ.

BY A. S. PACKARD, JR., M. D.

[Continued from page 115.]

**THYREOPUS**, St. Fargeau et Brullé.

*Thyreopus*, St. Fargeau et Brullé, Ann. Ent. Soc. France iii, 1837.

Head transversely oblong, being one-half as long as it is broad, wider than the thorax; in front deeply furrowed, being depressed from behind the eyes, sloping rather rapidly to the broad, deep, antennal groove. Ocelli arranged in an equilateral triangle on the elevated vertex; front more broadly triangular than usual. ♂ antennæ thick and short, with 13 joints, 2nd much ciliated, 4—13 very broad and flattened; under side of 4th—6th joints with short curved pencils of silvery pubescence; within dentate, terminal joint cylindrical. In the more aberrant species the ♂ antennæ are only slightly flattened or entirely simple. In the ♀ the antennæ are simple, cylindrical, slender, filiform, not thickened towards the tip. Clypeus one-half as long as broad, convex in front, edge smooth, base square, with a thin median ridge, most prominent at the base; covered closely with a dense silvery pubescence. In ♀ the joints of the maxillary palpi are broader than in ♂, 3rd and 4th joints of nearly the same length; 5th much swollen at tip; 6th long, cylindrical. Labial palpi much thicker than in ♂, 2—8 joints broadly triangular. Lingua nearly obsolete in ♂ and often in ♀. In one ♀ it reaches a little beyond the mandibles, is compressed and deeply divided, the lobes being very narrow. Mandibles of even width, the teeth unequal, rounded, truncate. Thorax sub-globose, prothorax angulated on the sides, with a lateral tubercle, more acute in ♂. Meso-scutum behind curving gradually around to the scutellum which is small and sublunate. Propodeum much as usual, but narrower behind.

Legs with broad triangular coxæ, beneath provided with a large, acute tubercle, trochanters longer and narrower than the coxæ; fore femora broad; fore tibia armed externally with a broad, triangular, shield-like expansion, often much longer than the length of the joint, sometimes lobed, the end acute or obtuse. The femora in *T. latipes* has a much smaller, though similar expansion, with a long, slender hook at the base of the opposite side. First joint of the tarsus short, broadly flattened, produced bluntly at the tip, remaining joints very short and broad, the terminal one produced laterally into a long vex-

hillum which ends in nearly as long a hook. In the two hinder pair of legs the coxæ are provided with an outer tubercle at tip, short, the trochanters long and narrow, the femora somewhat angulated and swollen; middle tibiæ with a small spur; hind tibiæ triquetal, with a row of setiferous tubercles, with two very large spurs. First tarsal joint a third longer than the remaining ones, or as long as all the rest together.

The ♀ has the fore-legs simple and rather slender, armed externally with spine-like setæ, there being six setæ on the basal joint; tibiæ triquetal, spined as usual. All the tibiæ have two unequal spines, the last pair being much the longest, 1st joint of hind pair nearly as long as the remaining ones together.

Abdomen narrower than the thorax, slightly sub-pedunculated, longer than the head and thorax together, a little broader in ♀, which has the tip broad, flat, triangular, the sides perfectly straight, not incurved as in *Crabro*; tips of ♂ broad, spatulate.

This genus may easily be distinguished from *Crabro* by its elongated body, the expanded fore-legs and antennæ of the males, and the females can invariably be distinguished from those of *Crabro* by the broad spatulate, flattened triangular, supra-anal area, since in *Crabro cephalotes* of Europe and *C. septentrionalis* of this country, which, in many of their characters, closely connect *Crabro* and *Thyreopus*, the ♀ tip is mucronate, the spine being unusually compressed and deeply grooved.

In this genus the ♂ head in front narrows rapidly toward the clypeal region, which is one-half as broad as the entire head behind the middle of the eyes; in ♀ it is much broader, but still much narrower than in *Crabro*, as the head is much shorter, much broader than the body, and more deeply excavated in front. The pterostigma, compared with *Crabro*, is more distinct, the second median space is much shorter, regularly diamond-shaped; the 2nd median recurrent terminates on the outer third of the length of the 1st sub-costal space, instead of at the end, so that the form of this space is five-sided, rather than distinctly rhomboidal, as in *Crabro*. The submedian space is proportionally shorter and broader than in *Crabro*, and the outer side, or second recurrent, is more obliquely curved outwards, where in *Crabro* it is curved nearly transversely, and is slightly angulated.

The female differs from *Crabro* in the shorter, more transverse, much less cubical head. The antennæ are slenderer toward the tips, propodeum more produced, the enclosure well developed and distinctly triangular, while it is nearly obsolete in *Crabro*.

## Synopsis of Species.

## A. Vexhillum present.

a. Antennæ broad and flattened, dentate.

- ♂. Vexhillum leaf-like, tip very acute.....*T. latipes*, Smith.  
 ♂. Vexhillum suborbicular, lobulated, leaf-like.....*T. coloradensis*, Pack.  
 ♂. Vexhillum obtusely triangular, scutellate, very convexly lobed behind, covered with dots; anterior margins obsolete.....*T. cribrellifer*, Pack.  
 ♂. Vexhillum acutely triangular, semicordate. Ungues present.....*T. argus*, (Harr.)

b. Antennæ subsimple.

- ♂. Vexhillum short sub-orbicular, scutellate; fuscous yellow spots on the thorax.....*T. signifer*, Pack.

c. Antennæ simple.

- ♂. Vexhillum less triangular, expansion short, half as long as joint itself.....*T. pegasus*, (Harr.)  
 ♂. Vexhillum square, brown, with a few yellow stripes, antennæ slightly fusiform; basal joint of abdomen fasciate.....*T. discifer*, Pack.  
 ♂. Vexhillum rhomboidal, anterior edge concave, posterior convex; abdomen with the basal joint tumid, black.....*T. tumidus*, Pack.

## B. Vexhillum absent, and instead a brush of hairs.

- ♂. Basal joint of abdomen with a yellow band.....*T. singulatus*, Pack.  
 ♀. Very large, with large yellow fascia on second ring beneath. ♂ unknown.....*T. monticola*, Pack.  
 ♀. Fore femora tipped with yellow.....*T. advenus*, Smith.  
 ♀. Unusually large broad band on basal abdominal ring, but one terminal continuous band.....*T. conspicuus*, Cress.  
 ♀. One-half as large as preceding, thorax black, abdomen with two slight basal sinuate fasciæ.....*T. succinctus*, Cress.  
 ♀. Yellow stripe on meso-scutellum, but one terminal band.....*T. vernalis*, Pack.

*Thyreopus latipes*.*Crabro gryphus*, Harr. Cat. Ins. Mass. p. 68. (1835.)*Crabro latipes*, Smith, Cat. Hym. B. M. IV. p. 396. (1856.)not *C. latipes*, Cresson, Proc. iv, p. 477. (1865).

♂. Closely resembles *C. coloradensis*, while the head is more transverse and smaller than in *T. cribrellifer*; surface puncto-striated, but not so distinctly striated as in *C. coloradensis*, with a slight hiatus between the ocelli and antennal groove; clypeal region a little longer and narrower than in *C. coloradensis*; clypeus yellow on each side of the carina, mandibles yellow on the basal half, tips rufous, antennæ as in *T. coloradensis*, flagellum being much wider than in *T. cribrellifer*; scape compressed, yellow beneath, black above, flagellum black.

Prothorax punctured, with a denticle on the side anteriorly, with a



slight ridge leading from it towards the mesial line, surface of the meso-scutum puncto-lineated, where in *T. coloradensis* it is simply punctured; scutellum punctured; post-scutellum minutely puncto-lineated longitudinally. Propodeum much more coarsely rugose than in the Colorado species, the mesial femora expanding into a broad diamond-shaped area much nearer the base of the segment than in the Colorado species. Wings much the same, but the costal nervures are much blacker than in the two other species. Fore tibiæ expanded into a long acute mucronate shield, which is much longer and narrower and less broadly leaf-like than in *T. coloradensis*. It also differs in form from that of *T. cribrellifer* in being more acute at tip, and having a broad sub-acute lobe on the anterior edge. It is not covered with dots, but with three broad, black, parallel, longitudinal stripes, of which the outer is one-half as long as the inner; also on the inner black base each of the three straight broad lines go to the inner edge; tarsi much as in *T. cribrellifer*; middle femora with a black line, above yellow; hind femora yellow; middle tibiæ yellow, with a black line within; hind tibiæ broad towards tip, black within, grooved beneath, on the outer edge a row of spinules; middle tarsi yellow; hind tarsi fuscous beyond base of first joint which is yellow, being much paler than in the two other species named above.

Abdomen as described in *T. cribrellifer*, being intermediate in size between it and *T. coloradensis*, but the basal pair of fasciæ are more sinuate and slenderer, the third and fourth pairs are entire as in *T. coloradensis*, not being excavated on the front edge as in *T. cribrellifer*; fifth pair united into a continuous band, entire; sixth pair separate again.

Length of body, .86 inch.

Connecticut, (Norton). Mass., (Harris' Coll.). Brunswick, Me., (Packard).

The broad, long, acute, mucronate, shield-like expansion of the fore tibiæ, with black, straight stripes at base, and on the outer edge, will distinguish it from *C. coloradensis*, and on the other hand, its middle femora lined with black above, and beneath yellow, will readily distinguish it from *T. cribrellifer*. It agrees closely in these characters with the Colorado species, as also in its abdominal fasciæ and antennæ, differing from both, however, in the sculpturing of the propodeum.

***Thyreopus coloradensis*, n. sp.**

*Crabro latipes*, Cresson, Proc. Ent. Soc. Vol. iv, p. 477. (1865).

♂. Body more elongated and slender than in *T. latipes*; head a little shorter, and narrowing more rapidly behind the eyes; surface

puncto-striated, freer from hirsuties than in that species; clypeus yellow, edge produced, angulated, covered densely with a silvery pubescence; basal half of mandibles yellow externally, piceous; antennæ black, broadly dilated, flattened, concave beneath, with no curl of hairs on basal joint of flagellum; scape yellow, lineated above with black. Thorax wholly black, with no yellow markings; whole surface more than usually coarsely punctured, especially the scutum and scutellum of mesothorax, and on the propodeum the striæ are parallel to the mesial furrow, rather indistinct though regular, while the transverse rugæ are almost obsolete. This area is longer and more produced than in *T. latipes*. Fore coxæ black, trochanters dilated towards the tip where are two small spines, thrice as long as broad; femora broadly dilated, but expansion is longer than broad; at base two large incurved hooks, yellow; tibiæ dilated into a broad leaf-like expansion, nearly as broad as long, concavo-convex, acutely pointed behind, with six acute teeth or lobes on the edge, yellow; from the tibia itself radiate to the outer edge and terminate in the lobes like the veins of a cabbage-leaf, nine curvilinear brown lines, the shortest narrowest, the long ones being straighter and broader in the middle; tarsal joints much as described in *T. latipes*, yellow, fuscous on the tips and edges; just above the insertion of the legs the thorax more densely covered with silvery pubescence; middle trochanters yellow; femora yellow, with a black streak on the upper side, joint not so broadly dilated as in *T. latipes*, tibiæ and tarsi yellow; first tarsal joint twice as long as the remaining ones together; in *T. latipes* the same joint is hardly one-third longer, terminal joints fuscous; hind femora black, tibiæ yellow, with an outer black dot; basal joint more than three times as long as the remaining joints together.

Abdomen long and slender, a little duller in hue than in the preceding species; a pair of lateral curved, not sinuated fasciæ on the basal joint, broadly ovate fasciæ on the 2nd joint, more remote than the others; 3rd and 4th pairs nearly contiguous, narrower than the preceding, the 4th divided into two fasciæ, and not forming a continuous line as in *T. latipes*; 5th and 6th a continuous line, with a shallow regular sinus in the middle, otherwise the band is not indented on its front edge, which is very straight and parallel; terminal segment broad and spatulate, piceous, with no yellow spot in the centre. On the under side of the 2nd abdominal ring are two larger fasciæ, comma-shaped, nearly meeting, and on the succeeding ring is a pair of dots; sometimes the fasciæ are wanting and only a pair of dots remain.

Length of body, .42; head and thorax, .20; abdomen, .22 inch.  
Colorado Terr., (Coll. Ent. Soc. Phil.).

Besides the much longer, slenderer, and more coarsely punctured body, the more broadly dilated antennæ, and narrower posterior part of the head, and the different mode of sculpturing on the propodeum, this species differs in other respects from *T. latipes* as in the structure of the legs, and the coloration as above described. The expansion on the fore tibiæ is shaped somewhat like a cabbage-leaf, the broad veins being represented by the curved dark lines. There is no sieve-like arrangement of transparent dots, no dots whatever being present. Seen laterally when the limb is appressed to the body, the plate is seen to be broader, its upper edge remarkably dentate; and the anterior half of the tibial joint above is yellow, where in *T. latipes* the entire joint is yellow externally. Also the striking differences in the coloration of the thorax and of the abdomen, where the fasciæ on the 4th ring take the place of the continuous one present in *T. latipes*, and the very even bands, not indented on their front edge, as also the presence of the fasciæ and dots on the under side of the abdomen, together with the striking differences in the comparative length of the tarsal joint, serve to distinguish the two species. Though the present species is slenderer than the other, the thorax is not so high and is more elongated; the sides of the abdomen are unusually parallel, being thus oblong, where in *T. latipes* the form is more ovate.

*Thyreopus cribrellifer*, n. sp.

♂. Head finely puncto-striated; body finely punctured; head black, between the eyes covered sparsely with a thin pubescence; orbits narrowly lined with a silvery pubescence; mandibles yellowish testaceous at base. Antennæ black with a slender scape, joints of flagellum expanded broadly on the sides, so that the outline of the flagellum is fusiform when seen from above, the basal joint being broader than long, beneath flattened concave, with a curl of silvery hairs on the 2nd joint, terminal joint long, tapering, cylindrical. Thorax finely punctured, propodeum coarsely rugose, with a median, deep, straight furrow, and a lateral net-work of high, raised, irregular ridges; entirely black, except two remote dots on each angle of the prothorax. The tubercle is often black, but generally yellow. Fore trochanters dark fuscous, ringed with yellow at tip; femora twice as long as broad, angular, flattened beneath and at base, provided with a long curved spine nearly half as long as the femora; above, the scutellate expansion, or vexillum, spreads out posteriorly into a long, broad, obtuse point, longer than

the joint itself, and twice as broad as long; outer margin brown beneath; tibix expanded into an unusually large, concavo-convex, sub-triangular plate, longer than broad, five-sided, the anterior edge inrolled and sinuate, thus making the anterior edge appear straight when seen from above; posterior edge deeply excised; base of vexillum thinly covered with yellow transparent dots, giving it a sieve-like appearance; these disappear on the outer edge, where it is deep brown: beneath, these holes are arranged in sinuate lines over the tibial joint, no radiating lines on the anterior half; basal joint of tarsus long and expanded triangularly; mesial joints very short and broad, fused together, terminal joints hardly expanded, larger, thin, and terminating in a flat triangular expansion; its edge broad, and abruptly terminating in a long, slender, incurved hook. Middle and hind trochanters and femora black; tips of the middle yellow; inner side of the hind tibix streaked with brown, terminal joints of tarsi fuscous.

Abdomen with sinuate yellow fascix on the three basal segments, the middle pair largest, nearly meeting on the median line of the body, the third pair indented on their front edge; a narrow, transverse, continuous band on the hind edge of 4th and 5th rings, dentated in front, a pair of fascix situated in the middle of the 6th ring, separated by a triangular black space; in middle of the 7th and terminal ring is a single yellow dot, sometimes nearly obsolete. Beneath, as usual, black.

Length of the body, .42; head and thorax, .20; abdomen, .21 inch.

Maine, common in August on *Spirxæ*, (Packard), Mass., (Sanborn). Illinois, (Coll. Ent. Soc. Phil.).

Our most abundant species northwards, it can be easily recognized by the larger vexillum and peculiar tarsi, and want of any yellow spot on the clypeus, and by the dentated yellow lines on the terminal rings of the abdomen.

*T. argus*, Pack.

*Crabro argus*, Harris, Cat. Ins. Mass. p. 68. (1835).

♂. Head shorter and narrowing behind more than in any other species, front more deeply excavated, and thus the eyes and ocelli rendered more prominent, the vertex being unusually convex, front broader, eyes more remote and clypeal region broader than in *T. cribrellifer*; surface puncto-striated, but more coarsely punctured and less finely lineated than in *T. cribrellifer*. Orbits on anterior half of the front silvery pubescent; clypeus yellow, covered with a dense silvery pubescence; mandibles yellow, tips corneous; antennæ with the scape dilated and longer than in *T. cribrellifer*, entirely yellow; flagellum remark-

ably broad and fusiform, the joints being greatly expanded, broader than long, and produced on the outer edge in front, so as to be sinuate, beneath very convex, 4 terminal joints cylindrical, short, the terminal one being scarcely two-thirds longer than broad. Thorax slender, but anteriorly punctured much as in *T. cribrellifer*. Propodeum with the enclosure more distinct than in the preceding species, the mesial longitudinal furrow obovate, with a lateral net-work of large sub-pentagonal fossæ; entirely black, no yellow spots whatever. Fore trochanters long, black, yellow at tips, with no terminal spines; femora long, broadly dilated, especially behind, with a long expansion terminating in a long thin hook, and a basal spine opposed to it; yellow, with black basal spot; tibiæ expanded into an exactly semicordate concavo-convex plate, the outer half being exactly straight, as the convex edge is revolute beneath, while the inner side is convex, especially towards the base, and slightly sinuate, narrowly triangular in its general form, base half as long as the sides, basal half expanding out on to the femora; yellow on basal half; throughout thickly dotted, seive-like, with fine transparent dots arranged in fine lines near the base; tarsal joints unusually well developed, basal joint three times as long as the remainder, widening towards the broadly truncated tip, convex beneath; 3rd joint developed into a broad hamule much as in *T. latipes*; joints very broad and short, flattened, with a long spinule externally. Middle legs entirely yellow, only the trochanters striped with black above; posterior pair of same proportion between the length of the joints and tarsi as in *T. latipes*, but the joints are a little slenderer. Hind trochanters black, femora black, tibiæ yellow, with an ovate black spot on both the outer and inner side; spines on the terminal joints of tarsus fuscous.

Abdomen very long and slender, arcuate; basal joint long and slender, with broad and arcuate fasciæ, either united, or a little separated; followed with two succeeding rings by remote, ovate, minute fasciæ, as in *T. latipes*; on the 4th ring they are narrow, transverse, excavated on each side of the median line of the body on the front edge, where *T. latipes* has them bidentate; on 5th ring are slight remote fasciæ. Beneath black, edges of rings piceous, as usual.

Length of body, .42; head and thorax, .19; abdomen, .23 inch.

Brunswick, Maine, taken in August on flowers of *Spiræa alba*.

Easily recognized by its very broadly dentate antennæ, the short head, retreating rapidly behind, the prominent eyes, the entirely yellow scape, immaculate thorax, and acutely triangular, semicordate, tibial expansion, the well-developed tarsal joints, the two yellow posterior pairs of legs, wherein it differs from its nearest ally *T. cribrellifer*.

**Thyreopus signifer**, n. sp.

♂. Head more cuboidal than in *T. cribrellifer*, being longer, and not narrowing so rapidly behind; the front less deeply excavated, eyes of same size, ocelli arranged in a similar low triangle; in front of them a transverse line of hairs extending towards the insertion of the antennæ. Clypeus as in *T. latipes*, a lateral line of silvery hairs along the front edge of the eyes, as usual. Antennæ simple, joints cylindrical, long and slender, sutures well marked, 2nd joint a third longer than 1st or 3rd; joints showing a slight tendency to become flattened beneath; black, scape yellow, black at base on upper side; mandibles black, a little yellowish at base. Prothorax above reddish-yellow, interrupted in middle; thorax much as in *T. cribrellifer*; a reddish-yellow stripe on scutellum; hind edge of yellow tubercle very convex.

Fore coxæ, trochanters and femora black, tibiæ expanded into a broad concavo-convex, shield-like plate, as long as broad, sub-pentagonal, the angles much rounded, and the end obtuse, being angulated near the middle of the posterior edge, and near the base of the anterior edge; tibiæ yellow, but the plate dark, with light lines radiating from the middle of the tibiæ, with other independent lines. Tarsi large, well developed, fuscous; middle and hind femora black; tibiæ yellow, with an external dark mark, tarsi fuscous. Abdomen smooth and shining as usual, yellow fasciæ as in *T. cribrellifer*, but they are broader and heavier, not indented, the stripes being continuous across the abdomen on the 4th and 5th rings; edge of 6th ring obscurely yellow, tip spatulate, a little hirsute.

Length of body, .42; head and thorax, .20; abdomen, .22 inch.

Brunswick, Maine. August, on flowers of *Spiræa alba*.

Easily known by its short, dark, shield-shaped plate or vexillum, which is as broad as long, and the presence of a yellow band on the meso-scutellum; its simple non-expanded antennæ, the fuscous yellow spots on the thorax, and entire non-indented abdominal fasciæ. It is of the same size as *T. cribrellifer*, but a little shorter.

♀. A female specimen received from Mr. Sanborn differs from the other sex by its shorter head, more deeply excavated front, and more convex vertex; the clypeus is longer, scape of antennæ more thickened, otherwise the color is the same. The thorax is sculptured and spotted the same, but the enclosure of the propodeum is more deeply furrowed and rugose on each side of the mesial furrow. Fore and middle legs colored as in *T. pegasus*, internal ring and two remote fasciæ one-half narrower than in *T. pegasus*, where they form a broad, scarcely interrupted band; terminal band narrower, tip of abdomen a little

broader. This ♀ will probably be eventually found to be the ♀ *signifer*, differing likewise from *T. pegasus* ♀ in its brighter yellow spots and different arrangement of the abdominal fasciæ.

Mass. (Sanborn).

In the following section (C) the head is shorter than in the preceding species, the clypeus rather narrower, raised in the middle, and the 13-jointed antennæ are cylindrical throughout, the 2nd joint of the flagellum long and slender, dilated, as long as the mandibles, which are narrow, longer, tooth somewhat pointed; palpi short, thick, joints hardly dilated, unusually hirsute, rather broad. The thorax is short, globose, the tubercle not colored yellow, prothorax rather broader than in the preceding sections. The fore tibiæ are provided with broad triangular expansions, much shorter than broad, or nearly simple, first joint of tarsus broad, as long as the remaining ones, tip a little produced, 2nd, 3rd and 4th short and very broad, of equal length, hind tibiæ more dilated than in preceding species, the propodeum is roughly sculptured; the outer sub-median recurrent is more oblique and angulated in the lower three-fourths than in the preceding sections.

The abdomen is much longer than the head and thorax together, much narrower than the thorax, flattened beneath, not arcuate as usual; basal ring twice as long as wide, thickened and convex above, tip rather triangular than spatulate.

***Thyreopus pegasus*, Pack.**

*Crabro pegasus*, Harr. Cat. Ins. Mass. p. 68. (1835).

♂. Body slender, black; head finely but distinctly punctured; orbits and clypeus silvery; mandibles brown, testaceous at tip, at base yellow; two basal joints of antennæ yellow, remainder piceous black, with a brownish spot on the upper side near the base. Thorax punctured like the head, prothorax yellow, interrupted mesially; tubercle yellow; tegulæ testaceous, concolorous with the nervures of wing; two yellow dots on meso-scutellum, sometimes obsolete and black. Surface of propodeum coarsely rugose, with high transverse and longitudinal ridges; enclosure not so distinct as usual, mesial furrow, and rugæ more distinct posteriorly; on each side of the mesial line a deep furrow; sides straight, bordered by straight longitudinal ridges; between these two furrows, a long, narrow triangular depression. Fore femora dilated, brown, with a longitudinal yellow stripe on the terminal half; on the yellow tibiæ a triangular vexillum, broadly angulated on the basal half of inner margin; surface covered with sinuate alternate light and dark lines, often interrupted into spots most thick-set on the outer half of the vexillum; middle femora brown, with a yellow

streak on upper side of the tip, tibiæ and tarsi yellow; hind femora wholly brown, tibiæ yellow, with an external broad-oval, lanceolate spot, likewise shaded with brown internally.

Abdomen black, on upper side of basal ring a pair of rather narrow, arcuate yellow spots, succeeded by thin spots, one on each ring, straight and tapering towards the median line of the body; the three last pairs of spots form nearly connected bands, especially the fifth pair which cover the posterior half of the ring. Tip yellow, finely hirsute.

Length of body, .34; head and thorax, .16; abdomen, .18 inch.

This is a smaller species than any of the preceding, and can be easily distinguished by the shape of the vexillum, which is considerably smaller than in *T. signifer*, and by the simple antennæ.

♀. A ♀ specimen which in Dr. Harris' notes is referred with some doubt to the present species, differs beside the usual sexual characters in having the scape of the antennæ entirely yellow. The prothoracic fasciæ are united on the median line. The thorax is sculptured the same, and the legs are colored in much the same way. The trochanters and femora are dark brown, tibiæ and tarsi yellow, femora shaded slightly with brown inside; middle and hind coxæ, trochanters and femora brown-black; hind tibiæ yellow, wanting the outer dark spot, but brown within. Abdomen colored the same, the fasciæ being, however, a little heavier; tip fuscous.

Length, .40, head and thorax, .19; abdomen, .21 inch.

Its cylindrical slender scape, rounded hind edge of the enclosure of the propodeum, and the broad, heavy fasciæ, will further distinguish the females of this species.

*Thyreopus discifer*, n. sp.

♂. Head subcubical, transversely oblong, being a little more than half as long as broad, vertex flat and broad, front broad, rounded and narrowing a little towards the insertion of the jaws; surface more coarsely punctured than usual, piceous black; antennæ with the scape plainly clavate, entirely yellow; flagellum short and thick, a little thickened in the middle, but not towards the tips; joints very short and slightly flattened, though not concave or denticulate, terminal joint very short, conical. Orbits silvery, clypeal region broad and long, silvery; mandibles black. Thorax stout, rather coarsely punctured, entirely piceous black, except two remote spots on the thorax, which is angulated on each side. Propodeum with the triangular enclosure very distinct, with a median, broad ovate, six-sided groove, much



broadier than below, on each side of which are five rugæ, directed obliquely outward; posteriorly with short, transverse slight ridges, becoming larger on the flanks; slightly pilose on the side of the thorax.

The femora are not much dilated, black, striped above with yellow; tibiæ broadly dilated into a concavo-convex square plate, with the edges as long as broad, corners rounded; front edge straight, much rounded externally, hind edge sinuate, lengthening externally; tibiæ themselves yellow, vexillum brown, paler on the edges, with a few spots and sinuate abbreviated lines near the inner edge, and a yellow spot at base; tarsal joints large and well developed, basal joint twice as long as broad, the two next very short and broad, fringed externally with a hirsuties, fuscous like the rim of the vexillum; middle femora black above, yellow beneath, tibiæ entirely yellow, middle tarsi broad and fuscous; hind femora black; tibiæ with rows of spines; tarsi fuscous. Abdomen smooth, as long as the rest of the body, arcuate, elongated ovate, basal joint a little swollen above; four large, slightly sinuate, yellow, lateral, remote fasciæ; tip broad spatulate, brown.

Length of body, .36; head and thorax together, .18; abdomen, .18 inch.

This is a larger and stouter species than the succeeding members of the genus, and by its cubical head, nearly simple antennæ, simple squarish vexillum and normal well developed fore tarsi, combines the characters of the two sections of the genus. The wing characters, the nodosities of the basal joint of the abdomen, together with the general shape of this region, ally it somewhat closely to *T. tumidus*, from which it is sufficiently distinct in its black scape, which is not clavate, but rather obscurely fusiform, and by its black and more coarsely punctured body; the basal joint of the abdomen is also fasciate where in *T. tumidus* it is unspotted.

***Thyreopus tumidus*, n. sp.**

♂. Head cuboidal, very finely punctured, black, lower part of the front near the clypeus covered broadly with a silvery pubescence; mandibles yellow, corneous towards tip; antennæ black, second joint yellow, with an oval black-brown spot on the inside, so that when the antennæ are appressed to the front, the two spots unite to form a mitre-shaped spot. Thorax finely punctured; prothorax with three dots, sometimes obsolete, on each side, one near the middle of the scutellum, the other two on the sides, which are often obsolete; a yellow spot on each side of the mesothorax. Enclosure of the propodeum distinct, and deeply furrowed.

Fore pair of trochanters and coxæ black, femora scarcely dilated within, the expansion (vexhillum) is convex on its inner edge, beneath irregularly concave, pale, straw yellow; tibiæ dilated into a square, subrhomboidal convex plate, as broad as long, both sides convex, hind margin convex, one-third shorter than the broad, concavo-sinuate anterior edge, which is externally produced into a blunt, rounded spot; straw yellow, vexhillum becoming brown towards the outer edge, with three alternate light and dark sinuate stripes, parallel to the joint; on the under side of base of joint a blackish dot; tarsal joints testaceous, expanded portions darker without; two hind pairs of femora black, tibiæ yellow, under side of hind tibiæ black-brown; tarsi testaceous brown, abdomen shining black, 3-spotted, the spots or short fasciæ, broad ovate, not approximating on the median line; basal joint black, convexly swelled above, tumid; spots on 2—5 rings with minuter spots, especially the second pair, tip covered sparsely with a slight hirsuties.

Length of body, .34; head and thorax, .16; abdomen, .18 inch.

♀. differs from the male in having the second joint of antennæ entirely yellow; prothorax yellow above, and the enclosure of the propodeum is transversely narrowly banded with yellow, and more hirsute than in the other sex. Fore coxæ and trochanters black; femora with the angles of the joint black, lineated with paler, externally a triangular yellow spot, running beyond the middle of the joint; tibiæ simple, yellow, tarsi fuscous; middle and hind trochanters and femora black; hind tibiæ yellow, with an internal brown spot near the tip.

The abdomen is flatter and broader than in ♂, and the three fasciæ are correspondingly narrower, but still remote above. The fasciæ are sinuate, the third pair very narrow above, at the base broadly dilated; beneath black in both sexes.

♀. Length, .40; head and thorax, .20; abdomen, .20 inch.

Illinois, (Norton,) Penn., (Coll. Ent. Soc. Phil.)

The cuboidal head, the remote broad, ovate spots on the abdomen, together with the simple antennæ and the broad, square plate on the fore tibiæ are characters easily separating this species, and throwing it into a distinct group of almost subgeneric value.

The female of the present species differs from the foregoing ones in the unusually cubical head, which is scarcely broader than long; vertex broad and flat; front narrower between the eyes than usual, being wholly concealed when the antennæ are folded back, the entire front of the head, including the eyes, is transversely oblong, not narrowing below at the insertion of the antennæ so much as usual. The clypeal

region is broad, but the two lateral pieces very short, though broad, while the clypeus is long, very slightly truncated and raised before the emarginate edge, being two-thirds as long as broad, and deeply convex in front, edge smooth, not indented; mandibles long, slender, second tooth nearly obsolete. Palpi slender, joints scarcely flattened, terminal joint cylindrical, much as usual. The antennæ are small and cylindrical, short, second joint subclavate, swelled slightly, beneath full and slightly angulated longitudinally; terminal joint not dilated, joints hardly longer than broad. The hind femora and tibiæ differ in having the tibial spur much smaller, and the tibiæ more spinulated, and in the longer tarsi.

Those from Illinois differ a little from the Pennsylvanian specimens in having the meta-scutellum yellow, on the femora a mesial yellow line, on each side a small, black, broad stripe, tarsi brown, a pair of lateral and yellow spots on each side of the basal ring of the abdomen, scape almost entirely yellow, orbital and clypeal region silvery; mandibles entirely black; middle femora yellow at tips and beneath, black instead of brown, and tibiæ entirely yellow; mesothorax with a very long, silvery pubescence.

***Thyreopus cingulatus*, n. sp.**

♂. Head black, very finely punctured; clypeal region silvery, a narrow line of silvery pubescence extends along the eyes, nearly half way from the clypeus to the ocelli; antennæ black, the two basal joints entirely yellow; thorax black, an interrupted yellow stripe on the prothorax, tubercle yellow; tegulæ testaceus, concolorous with the nervures; two small, yellow dots on the meta-scutellum. Enclosure of propodeum sublunate, with six raised longitudinal striæ and transverse acute rugæ between them, the two mesial striæ converging posteriorly; on the posterior part the parallel longitudinal striæ are bounded by raised crests, with transverse rugæ. Fore legs yellow, tibiæ dilated externally, but not greatly thickened, with a curved brush of fine hairs along the whole length of the joint, a similar line of hairs along the flanks of the thorax above the insertion of the legs; middle pair of legs entirely yellow, hind legs with the trochanters black above; yellow beneath, a slight longitudinal black streak on the upper side of the coxæ; femora yellow beneath and on the sides, black above and at tip on the sides, terminal half of the tibiæ black above, forming an ovate spot; tarsal joints yellow, with a broad stripe on the upper side of basal joint; on the succeeding rings, a pair of broad, large spots, nearly meeting on the mesial line; on hind margin of each of

the three succeeding segments is a transverse yellow band, indented on the median line; tip brown-black, slightly hirsute. Beneath black, with two large, yellow patches on 3d and 4th rings, separated on the 4th, and confluent on anterior portion of 3d.

Length of body, .36; head and thorax, .16; abdomen, .20 inch.

♀. Besides the usual sexual differences, the ♀ differs in having the yellow band on the prothorax wider on the sides, two angular spots on flanks of mesothorax, posterior one oblong, and the anterior one, or tubercle, triangular as usual. The mesoscutellum is almost entirely yellow; fore femora black, yellow at tips; middle trochanters black, yellow at tip; femora black, yellow at tip, tibiæ yellow; tarsi yellow, brownish towards the unguis; hind legs black, except the tibiæ, which are testaceous towards the tips, with a blackish spot on the upper sides towards the tips.

Length of body, .30; head and thorax, .18; abdomen, .18 inch.

Illinois, (Coll. Ent. Soc. Phil.)

Differing in the additional spot on the flanks behind the tubercle, and the yellow scutellum and black legs, the ♀ is referred with some hesitation to this species.

This species may easily be known by its slender habit; the fore tibiæ are scarcely dilated; and there is a brush of hairs replacing the vexillum, and the upper side of the basal joint of the abdomen is surrounded by a yellow band, while the remaining spots are broader and heavier than in any of the other species.

***Thyreopus monticola*, n. sp.**

♀. Head shorter and broader than in the preceding species; eyes shorter and smaller, and much farther apart, so that the front is much broader and larger than usual; ocelli arranged in a curved line in a low triangle; antennal groove not well marked, no pubescence on the orbits; in front of the ocelli are a few sparse brown hairs; surface distinctly puncto-striated; head rounding in front towards the insertion of the mandibles; clypeus one-half as long as broad, being short and broad, slightly carinated, lateral lobes broad but short, silvery. Mandibles large and heavy, slightly bidentate, but the upper tooth is nearly obsolete, so that it is almost unidentate. Antennæ rather long and slender, scape large, clavate, more than usually thick at the extremity, yellow, brown at base and tip on the upper side; flagellum long and slender, black.

Prothorax yellow above, the two fasciæ slightly separated; mesoscutum distinctly furrowed in the mesial line, while the submesial

ridges are nearly obsolete; surface rather finely punctured; scutellum with a mesial yellow ovate spot. Enclosure of propodeum with high, thin ridges of unequal length, radiating from the mesial furrow, which is unusually deep and narrow; posteriorly the rugæ become transverse and finer. Fore femora black, above yellow, with a ferruginous stripe inside; tarsal joint yellow, tip and remaining joints ferruginous; middle and hind femora black, tibiæ yellow, black at tip, with numerous thick tubercles ending in the spinules; joints much thicker and stouter than usual, tip of basal joint and terminal ones rusty black.

Abdomen long and flattened above, beneath convex, with two large sinuate yellow bands on the basal ring, two long, ovate fasciæ on the two succeeding rings; on the fourth ring the bands nearly meet; on the fifth ring is a broad band, not indented on the median line, but sinuated at each end on the side of the abdomen. Tip broad and flat, spatulate, edges hardly raised, ferruginous. Beneath are two broad, large fasciæ on the second ring; edges of the terminal segments hirsute on the sides.

Length of body, .58; head and thorax, .28; abdomen, .30 inch.

"Pinkham Notch, Jackson, N. H.," Aug. 3. (Coll. Harris).

Differs from the succeeding species not only in its unusually larger size, its smoother, more transverse head, smaller eyes, consequently farther apart, but also in having the ocelli arranged in a low triangle or curved line, with long antennæ, thickened scape, together with the large, yellow fasciæ on the under side of the second segment of the abdomen.

***Thyreopus advenus*, Pack.**

*Grabro advenus*, Smith, Cat. Hym. Br. Mus. iv. p. 421. (1856).

Specimens from Connecticut agree in most respects with Colorado specimens, but the fore femora are not so broadly tipped with yellow, nor are the abdominal fasciæ quite so heavily marked. In one specimen, apparently immature, the fasciæ are greenish yellow; the meso-scutellum is entirely black, the body a little shorter and broader than usual, and the propodeum has the enclosure more finely striated at the base than in the other specimens, wherein the Western specimens all differ from those taken in New England.

In the very minute fasciæ on the basal joint of the abdomen, this species reminds us of the coloration of *Philanthus*; this resemblance is aided by the short, broad head and slender form.

This will ultimately be referred to some one of the species (♂) noticed before. Probably one of the three allied to *vicina*, will be re-

ferred to three distinct species as soon as the sexes are identified by taking them while united.

Col. Terr., (Coll. Ent. Soc. Phil.) Maine, (Packard.) Connecticut, (Norton).

***Thyreopus conspicuus*, Pack.**

*Crabro conspicuus*, Cress., Proc. iv. p. 480. (1865.)

Col. Terr. (Coll. Ent. Soc. Phil.)

***Thyreopus succinotus*, Pack.**

*Crabro succinctus*, Cress., Proc. iv. p. 479. (1865.)

Col. Terr., (Coll. Ent. Soc. Phil.)

***Thyreopus vernalis*, n. sp.**

♀. Head very short and broad, not one-half as long as broad. Eyes reach behind the middle of the head, and the ocelli are set farther back on the head than usual, and in a curved line upon a triangular area, distinctly marked in front by two lines meeting to form the apex of the triangle. Vertex depressed in front of the ocelli, a well-marked mesial impressed line extends down to the antennal groove; a slight long and silvery pubescence lines the orbits, not extending so high up on each side of the antennal groove as usual, above which are a few long, sparse, sandy hairs. Head broad in front, rounded towards the insertion of the mandibles; clypeal region broad, but short; clypeus shorter than usual, less than one-half as long as broad, flattened, but slightly ridged, not carinated; mandibles long and slender, unequally bidentate; lower tooth the smallest. Antennæ slender, scape dilated clavate, black, tip yellow; flagellum black, hardly clavate, sutures not well defined.

Prothorax narrow, sides angular, but not dentate, mesial notch quite well marked, flat on each side, not carinated, greenish yellow. Surface of thorax finely, minutely and sparsely puncto-striated, with long hairs arising from them; a brown-yellow stripe on the meso-scutellum and meta-scutellum; on front part of the scutum is a long, distinct impressed mesial line; no submesial lines present. A large, very distinct lunate enclosure on propodeum, finely puncto-lineated on each side of the broad, shallow mesial furrow, which below extends triangularly towards insertion of abdomen, forming an unusually broad, smooth, depressed area, while the two halves of the scutum are irregularly striated, covered by an irregular net-work of ridges; tegulæ black, as are the hinge-pieces of wings which last are clear, not clouded, nervures bright ferruginous. Legs rather stout, femora unusually swelled, black, tibiæ rather short, thickening towards the tip; fore and

middle tibiæ black, within pale yellow, basal half of hind tibiæ pale yellow, black beyond, the joint subtriangular, widening towards tip, finely and sparsely pubescent, with two rows of slight, slender minute spinules; fore tarsi pale yellow, unguis blackish brown; 2d—4th joints of middle tarsi slightly ferruginous, unguis brown; hind tarsi ferruginous, darker towards tips of joints and on sides.

Abdomen not so long as the head and thorax together, somewhat flattened, hardly convex beneath, 1—5 rings with a pair of greenish yellow fasciæ, of which the last pair nearly meet, and the others closely approximate, except those on 3d and 4th rings, which are more remote and ovate, 2d pair largest. Tip broad triangular, slightly channeled, surface flat.

Length of body, .34; head and thorax together, .18; abdomen, .16 inch.

Illinois, (Coll. Ent. Soc. Phil.)

Easily known by its unusually short, transverse head, the nearly black antennæ, unequally toothed mandibles, broad and short flattened clypeus; the broad smooth tibiæ and the two large yellow stripes on the meso-scutellum and meta-scutellum. The body is highly polished, smooth, and the spots and fasciæ are of a pale greenish hue. This species leads to the *Nyssonidæ* by its short, transverse head, the shape of its abdomen, and general habit.

**BLEPHARIPUS**, St. Fargeau.

♂. Head transversely oblong, being a little less than one-half as long as broad, narrowing slightly behind; front triangular, somewhat depressed below the margin of the rather globose eyes, median suture deeply impressed; clypeal region two-thirds as broad as the entire head; clypeus itself full as long as broad, front edge convex, acutely serrated; antennæ rather long and slender; 2d joint slightly swelled; tip tapering, not thickening as in ♀; joints of palpi weak, broadly compressed, terminal one slender, cylindrical; mandibles long, slender, bidentate, teeth subequal. Thorax subglobular, longer than in *Crabro*; propodeum being more sensibly produced; prothorax broad as usual, smooth, convex above; mesoscutum uniformly a little longer than in *Crabro*, as is the mesoscutellum. Propodeum with a broad, subcordate smooth area, which is longer than in *Crabro*, where it is invariably striated. Wings with the pterostigma unusually distinct; all the cells are broader and shorter than in *Crabro*; 2d subcostal space shorter than usual, 2d subcostal recurrent terminating within the middle of the 2d costal cell, while also the 2d median recurrent terminates in the

middle of the subcostal area; 2d median cell much shorter than in *Crabro*; 2d submedian space shorter, and its outer side much more oblique and curved than in *Crabro*, when it is more or less angular. Legs slender, smooth, joints not slightly spinulated.

Abdomen longer than the head and thorax together, slender and narrow, subclavate, slightly pedunculate, basal joint being narrower and longer than in *Crabro*, and the entire region more arcuate; tip spatulate.

♀. Head transversely oblong, being a little more than one-half as long as broad, broader than in ♂; front even with the margin of the eyes; quadrilateral, but rounding inwards a little, towards the insertion of the mandibles; front between the eyes rather narrow triangular, median line deeply impressed, does not spread out so broadly on the vertex as usual; clypeal region one-half as broad as the head; clypeus itself trapezoidal, full as long as broad, well raised in the centre; eyes rather narrow, not globose as in *Crabro*; antennæ normal, thickening a little towards the tip; joints cylindrical, a little enlarged in the middle; mandibles as usual, bidentate, teeth equal; palpi not very slender, joints broad, compressed. Femora more swollen and spinulated than in ♂. There is a tendency in the ♀ abdomen to thicken towards the tip, where in *Crabro* it is thickest in the middle; tip triangular, acutely produced, flattened above with prominent lateral ridges.

This genus may be easily distinguished from *Crabro*, by its shorter head, which is much more transverse, being less cubical; the eyes are less globose, more aligned with the surface of the front, or epicranium, and smaller and narrower; the front is not so deeply impressed by the antennal groove, and the 2d joint of the scape of the antennæ is more cylindrical, less liable to become angular, as are the terminal joints which are cylindrical, where in *Crabro* they are sometimes dentate beneath. One of the best distinctive characters lies in the very narrow clypeal region, as in this genus the eyes completely cover over the lateral clypeal region which is so characteristically exposed in *Crabro*, while the clypeus itself is longer, with its front edge more rounded and deeply toothed. The palpi are smaller and weaker than in *Crabro*, besides being more compressed. The thorax is more produced behind, as is the abdomen also, being longer than the anterior part of the body, while in *Crabro*, though this is not a constant character, the abdomen is apt to be either equal in length to both the head and thorax taken together, or even shorter; the triangular tip of the



abdomen is also longer than in *Crabro*. But in the neururation of the wings are excellent characters for separating the two genera, as the small, short 2d median cell is very regular diamond shaped, and the 2d submedian, of which the outer recurrent (or side) is curved obliquely, where in *Crabro* it is straight, or if slightly oblique, is always angulated below its middle.

The species vary much in coloration and sculpturing. *B. 4-maculatus*, of Europe, and *B. maculipennis* are spotted and banded with yellow, much as in *Crabro*, but most of the species are black, almost immaculate, such as the group of species of which *B. minimus* and *B. ater* are types.

It is difficult to say which is lowest of these two genera, *Thyreopus* or the present one, but the greater mass of characters place *Thyreopus* next to *Crabro*, and then should follow *Blepharipus*. The two groups are in some respects parallel, though in a linear series we have to do violence to their relative position in nature, and assign a subordinate position to one or the other.

The present genus, by the darker, smaller species, evidently leads to *Rhopalum*. *Blepharipus* differs from those species of *Thyreopus* with simple antennæ and legs, by the flattened vertex, smooth, highly polished enclosure of the propodeum, the longer clypeus and more cylindrical abdomen.

### *Synopsis of the Species.*

#### A. Species of large size, wings spotted.

♂ ♀. Fore femora tipped with yellow.....*B. maculipennis*, (Fab.)

#### B. Species of diminutive size; wings unspotted.

♀. Body stout—deep shining black.....*B. ater*, (Cress.)

♀. Tip of abdomen channeled; wings distinctly testaceous.....*B. impressifrons*, (Smith.)

♂. Abdomen entirely black, anterior femora reddish and tipped with yellow.....*B. scutellatus*, (Say.)

♂. Enclosure lined, hind tibiae nearly all yellow, abdominal rings obscurely testaceous.....*B. Harrisii*, Pack.

♂ ♀. Hind tibiae black, ringed with whitish at base.

♀ tip not channeled.....*B. minimus*, Pack.

### Section A.

#### *Blepharipus maculipennis*.

*Bl. maculatus*, St. Farg. and Brulle, Ann. Ent. Soc. France, iii. p. 730. (1834.)

*Crabro maculatus*, Dahlbom, Hym. Eur. i. p. 344, 226. (1845.)

*Crabro maculipennis*, Smith, Cat. Hym. Br. Mus. iv. p. 417. (1856.)

♂ ♀. Head much as usual, transverse, vertex as usual flattened in front of the ocelli; clypeal region narrow, silvery; clypeus much

as usual, mandibles scarcely differ, black, tips piceous. Antennæ stouter, scape clavate, angular, entirely yellow; flagellum black, thicker than usual, sutures well defined.

Prothorax narrow above, not rounded on the sides, with a yellow interrupted stripe, thorax polished, minutely punctured, polished. Scutellum with, or without a lunate spot; meta-scutellum black, minutely punctured like the mesoscutum. Lunate enclosure smooth, highly polished, not striated, divided by the mesial furrow into two quadrant-shaped areas; at the base of the segment a row of small fossæ, which are repeated on the posterior edge of same enclosure; the furrow widens towards the base of the enclosure so as to include two of the fossæ. Sides of the segment behind bounded by a high ridge, giving a trapezoidal form to this area, while within are slight transverse ridges at the bottom, and above, the coarse surface is minutely and sparsely punctured. Tegulæ dark testaceous, wings with the costal nervures blackish, and posterior ones rufous; pterostigma black; two costal discolorations, one spot fuscous at the outer end of the first median area, the other at the middle of the outer costal area; another slight discoloration at the lower end of the first sub-costal area. Fore and middle femora black, broadly tipped with yellow; hind femora black; tibiæ yellow, brown beneath, especially the middle pair; hind tibiæ sometimes ringed at tip with brown-black; tarsi yellow, apical joints of middle and hind pair fuscous.

Abdomen shorter than the rest of the body, polished, black; beneath flattened, above convex, in ♀ it is broadly ovate. Basal ring immaculate. ♂ with five, ♀ with four straight yellow fasciæ nearly meeting above; 3rd pair the most remote. In ♂ the fourth pair are narrowest, in ♀ they are broadest, sub-orbicular, and almost connected. ♀. Tip short and broad, nearly equilaterally triangular, compressed at extreme tip and slightly grooved.

Length of body, ♂, .36—.42, ♀ .44; head and thorax together, ♂ .20—.24, ♀ .27; abdomen ♂, .16—.18, ♀ .20 inch.

Andover, Mass. (Sanborn). Cambridge, Mass. (Coll. Harris). Mass. and Maine, (Norton and Packard).

This species is easily distinguished from all the others of this genus by its large size and spotted wings. In one case it differs in the size of the antennæ, in the fore femora being yellow at tip, reddish beneath, and black at base; in another specimen the same joints are entirely black. In the ♂ specimen collected by Dr. Harris, which is larger than the others, the antennæ are slenderer and more filiform. The

two smaller specimens have the scutellum black. All agree in the mode of sculpturing, the spotted wings and the abdominal fasciæ. The heads vary a little in size and comparative length and breadth. Though this species shows an unusual tendency to variation, the specimens agree in the most essential characters.

#### Section B.

##### *Blepharipus ater*, Pack.

*Crabro ater*, Cresson, Proc. iv. p. 477. (1865).

In this species the enclosure of the propodeum is smooth and highly polished, the abdomen shows a slight tendency to become pedunculated, and thus connects the pedicellate and sessile species. A specimen from West Virginia, differs from the Colorado specimens in having the scape of the antennæ yellow beneath, and the hind tibiæ whitish-yellow at base. Those from Maine differs only in size from those of Colorado, being smaller.

Col. Terr., West Va., Ridings, (Coll. Ent. Soc.). Brunswick, Me. August, on flowers.

*Blepharipus ater* presents most interesting differences from *B. maculipennis* and *B. 4-maculatus* of Europe. They are of such a nature as to throw *B. ater* into a distinct section of the genus, characterized by the smooth, highly polished, broad cordate enclosure of the propodeum, while the body is deep black, immaculate and more coarsely punctured than in the other species.

##### *Blepharipus impressifrons*.

*C. tibialis*, Say, Long's 2nd Exp. Appendix, p. 340. (1824). Preoccupied.  
Harr. Cat. Ins. Mass. p. 68. (1835).

*Crabro impressifrons*, Smith, Cat. Hym. Br. Mus. iv. p. 417. (1856).

♀. Head cubical, two-thirds as long as broad, vertex full convex; ocelli arranged in an equilateral triangle, deeply channeled towards the antennal groove. In front the head does not narrow much towards the clypeal region, which is covered with a dense silvery pubescence, extending to the orbits. Mandibles black, acutely bidentate, hirsute towards the base on the upper and lower edges. Antennæ slender, scape slender, with a dark stripe on the inside; flagellum black, joints stout, slightly swollen, sutures well defined, terminal joints obconic. Head finely and sparsely punctured.

Prothorax convex above, not angulated on the sides, with a slight mesial notch, with a continuous yellow band across. On the meso-scutum a distinct impressed mesial line; sub-mesial ridges\* short, indistinct; on scutellum a large conspicuous, lunate, yellow band; post-

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\* See the import of these in *Chalcis* sp.

scutellum dark. On thoraco-abdominal ring the mesial furrow widens towards the base, granulated, while the enclosure is highly polished on each side, with no punctures or lines. Beneath smooth. Legs smooth, femora black, fore and middle broadly tipped with yellow, posterior pair entirely black, tibiae yellow; tarsi yellow on the basal joint, growing more ferruginous towards the unguis.

Abdomen hardly longer than the thorax alone, narrow, as broad as high, cylindrical, being very convex above, each ring continuously banded on the hinder edge with obscure testaceous, tip acute, though not so much so as in most of the species.

Length of body, .28; head and thorax together, .18; abdomen, .10 inch.

Cambridge, Mass., on flowers. (Harris Coll.). New York, (Angus, Coll. Ent. Soc. Phil.).

This species will be easily known by its smooth thoraco-abdominal segment, the obscure testaceous hinder margin of the abdominal segments, and by its prothorax being continuously banded above, not being interrupted by the mesial notch. The tubercle is not colored yellow, this together with the large yellow scutellum and its small size will readily distinguish this interesting species.

One of the specimens still had the pellicle of the sub-imago—for such a stage exists in some of the Hymenoptera as well as in the Neuroptera—still attached to the abdomen, and the wings had not acquired their elasticity, as the fluids had not evaporated from their surface when the insect was taken. This specimen in the manifest immaturity of the abdominal region as compared with the anterior regions of the body, is interesting, as affording an additional proof of the progressive development of the body from the head backwards. This fact I have observed in the development of the genus *Bombus*. The parts remotest from the head, and the terminal portions of the appendages are the last to come to maturity. Also in this same specimen the tarsi are still immature, while the tibiae are mature, having obtained their usual hues and density of the outer crust.

***Elepharipus scutellatus*.**

*C. scutellatus*, Say, Long's Second Exp. App. p. 341. (1824).

Smith, Cat. Hym. Br. Mus. iv. p. 418. (1856).

♂. Head as described in *B. impressifrons*, but more transversely elliptical, and narrowing more behind; vertex and front the same; clypeal region narrower and clypeus proportionally longer, well carinated; mandibles piceo-fuscous; equally bidentate, darker at the upper edge

at extreme tip, and at base; antennæ with scape either entirely yellow beneath and brown above, or yellow on the basal third beneath; basal joint of flagellum shorter, more spherical and darker than in *B. impressifrons*; terminal joints sub-fuscous, where in *B. impressifrons* they are dark; joints somewhat slenderer. Thorax and wings as in *B. impressifrons*, tubercle not yellow; prothorax and scutellum yellow. Propodeum with a sublunate enclosure bounded by a punctured line; posterior region smooth above, rugose on the sides, which are exteriorly carinated. Fore trochanters fuscous, femora fuscous, yellow at tip and beneath; tibiæ and tarsi yellow; middle femora brown, with a posterior reddish stripe, tipped broadly with yellow; hind femora entirely brown, tibiæ yellow, with an apical brown spot; tarsi pale testaceous brown, with pale testaceous tips. Abdomen sub-pedunculate, thickening to just before tip; tarsal joint narrowing rapidly towards its insertion into the thorax; posterior third of each ring slightly contracted and smoother than the rest of the ring.

Mass., (Coll. Norton). New York, (Norton).

Its black abdomen, yellow and reddish fore-legs, and fuscous posterior stripe on the middle femora, will separate this species from *B. impressifrons*, besides the transverse line on the enclosure being deeply punctured by minute fossæ. Having no female, and the two males above described being without the yellow spot on the tubercle, there is yet a doubt whether this be the *scutellatus* of Say or not, though otherwise agreeing with his description.

***Blepharipus Harrisii*, Pack.**

*Crabro pusillus*, Harris, Cat. Ins. Mass. p. 68, (1835).

♂. Head as described in *B. impressifrons*, the impressed line in front of the ocelli being present, the front narrow, depressed; ocelli in an equilateral triangle, but the head is shorter and more transverse. Orbits and clypeal region silvery, the latter narrower than in the preceding species, proportionally longer and more strongly carinated than in *B. impressifrons*. Mandibles slender, bidentate, tip deeply grooved beneath the teeth, black, tip rufo-testaceous. Joints of palpi slender, cylindrical, testaceous. Scape of antennæ long and slender, clavate, angular, dark brown above, beneath obscurely yellow, basal joint of the flagellum brown, not black, filiform, slender, and longer than in *B. impressifrons*.

Prothorax narrower than in *B. impressifrons*, with a yellow stripe slightly interrupted by a mesial notch. Mesothorax quite smooth, polished, slightly and sparsely punctured, with long hairs arising from them; entirely black. Propodeum with a distinct semi-ovate enclosure,

with fine striæ diverging from the mesial furrow, which is narrow but distinct; towards the flanks the striæ become transverse. Wings immaculate, clear, iridescent, costal nervure dark rufous, posterior nervules testaceous, pterostigma dark. Fore femora reddish-yellow, stained with brown externally; middle femora dark brown, yellow beneath and at tips; hind femora entirely brown; tibiæ yellow, posterior pair tipped with brown; two anterior pairs of tarsi yellow, posterior ones dark.

Abdomen cylindrical, very much rounded above, beneath convex, nearly equalling the head and thorax together in length, longer, narrower and slenderer than in *B. impressifrons*, brown-black, edges of the abdominal segments obscurely pale, more so than in the species above mentioned.

Length of body, .26; head and thorax together, .18; abdomen, .18 inch.

Differs from the species with which it has been compared in the description given above, in its shorter more transverse head and slenderer body, in its fore femora being entirely yellow above; in the sculpturing of the propodeum, where in *B. impressifrons* it is entirely smooth. The hind tibiæ are much smoother, scarcely spinulated. It will also be readily distinguished by the want of the pale testaceous posterior margin of the abdominal segments.

Cambridge, Mass., (Coll. Harris). "June and August 15, on flowers." Harr. MS.

A *Crabro pusillus* has been described by Herrich-Schaeffer from Germany.

*Blepharipus minimus*, n. sp.

♂ ♀. Head of the same proportion as in *B. impressifrons*, but the vertex is a little fuller, orbits with a slight silvery pubescence, clypeal region silvery, slightly contracted in width. Clypeus large and mesially carinated, nearly two-thirds as long as broad. Mandibles long and slender, curved, with a row above and beneath of coarse setæ, yellow, tips piceous. Scape of antennæ long, clavate, angular, yellow beneath, dark brown above and on the sides, basal joint of flagellum larger than usual in this group, terminal joint acutely obconic; palpi pale testaceous, joints long and slender, cylindrical.

Prothorax narrowly convexly crested in a transverse sense, square but not angulated on the sides, with a continuous, linear, yellow stripe above, surface of thorax minutely and sparsely punctured; tubercle yellow; mesoscutellum and metascutellum highly polished, black.

At base of propodeum is a row of minute fossæ, a well-marked, semi-

ovate enclosure, minutely lineated by diverging striatulæ, so fine on the convexities that the surface, to the naked eye, seems smooth; posterior vertical face of this segment, flat trapezoidal, mesial furrow shallow, with coarser lines than in the enclosure; sides limited by a distinct raised line; flanks finely lineated. Tegulæ testaceous, hinder wing pieces yellow, large anterior one black; costal nervures dark, pterostigma black, wings clear iridescent. Fore femora yellow beneath in ♂, in ♀ tips only yellow; two posterior pairs black-brown; fore tibiæ entirely yellow, middle stained with brown inside, hind pair black, with a broad yellow ring at base; fore tarsi yellow, fuscous on the terminal joints, middle and hind yellowish testaceous, basal and terminal joints with an obscure, peculiar light brown tint. Abdomen shaped as usual, cylindrical, shorter than the rest of the body in both sexes, broader in ♀. Edge of rings not paler than the rest of the segment. Tip of ♀ unusually broad, nearly equilaterally triangular, surface flat, with a few scattered, short, minute setæ, slightly ridged on the setæ, not grooved, and twice as broad as in *B. impressifrons*.

Length of body, .18; head and thorax together, .11; abdomen, .8 inch.

Brunswick, Maine, abundant on flowers in August. (Packard.)

Differs from the allied species, not only by its smaller size, but when compared with *B. Harrisii* the head is seen to be larger, the femora stouter, prothorax narrower, in a longitudinal sense, than in the other species, and from both in the presence of the yellow tubercle. *B. impressifrons* differs from both in the polished, smooth, propodial enclosure. The scape of the present species is blacker than in the other species, and the rings of the abdomen are wholly black, which will readily distinguish it from the smaller species of the genus. It is allied to and represents in this country, *Crabro Westmaeli* V. Lind., and *C. spinipectus* Shuck. of Europe.

#### **RHOPALUM, Kirby.**

*Rhopalum*, Kirby, Steph. Syst. Cat. 366. (1829).

*Physocelis*, St. Farg., Ann. Ent. Soc. France. (1834).

*Corynopus*, St. Farg., Ann. Ent. Soc. France. (1834).

♂. Head transversely elliptical, not oblong, as the sides of the head round regularly, since it is very short and broad, and the sides narrow rapidly behind the eyes, being more transverse and shorter (antero-posteriorly) than in *Blepharipus*. Vertex much as in *Blepharipus*, but not so depressed in front of the ocelli, which are situated in a more equilateral triangle and are more prominent than in *Blepharipus*. Frontal impressed line deep, well marked, front convex on each side. Eyes

narrower than usual, much more remote, slightly excavated above; antennal groove broad and deep, with wide, flat orbits. Clypeus longer than broad, large, broad, front edge of the entire clypeal region deeply arcuate. Clypeus elongate and produced into a large round lobe, with inrolled edges, slightly carinated towards the base. Palpi weak, joints very slender. Maxillary palpi four-jointed. Labial palpi very short, terminal joint long and slender, cylindrical. Mandibles much as usual, a denticle on each side of the oral region, opposite the base of the labium. Antennæ short, 14-jointed, scape short and broad, much swollen; 2nd joint of flagellum nearly as long as the scape itself, pinched at base, expanding into a broad lateral lobe; 3rd joint like 2nd, but one-third shorter; succeeding joints shorter than broad, sutures well defined, terminal joints short, obconic. Thorax much as in *Blepharipus*, but a little more elongated posteriorly, flanks of mesothorax very full and convex, while the region behind is narrower and more contracted than usual. Propodeum with a smooth, semi-ovate space above, not striated on the sides, but smooth, with a delicate pubescence, thus differing from *Blepharipus* where this part is rugose and striated. Wings with the first sub-costal interspace much broader than in *Blepharipus*, and more irregular, six-sided; second median space very broad, half as broad as long, being broader than in *Blepharipus* and *Crabro*; outer side of sub-median space, curved, scarcely angulated. Two anterior pairs of legs very small and slender, posterior pair greatly enlarged, tibiae clavate, greatly thickened, cylindrical towards the tips, while the tarsi vary in being long and slender, or unusually short, half shorter, and in proportion much broader than in *Blepharipus*.

Abdomen pedicellate, much longer than head and thorax together, basal joint being full as long as the abdomen is broad, clavate, forming a node at the posterior end; body of the abdomen long ovate, nearly equalling in length the head and thorax together, cylindrical, convex above and beneath; tip more acutely spatulate than usual; size small.

♂ agrees with the male in the wing characters, the abdomen being also pedicellate. In the head characters it agrees closely with *Blepharipus*, but still the front is broader, the eyes being a little more remote, the clypeal region much narrower, and consequently the clypeus itself much longer, with the front edge produced into an acutely angulated lobe. Antennæ shorter, sutures distinct; meso-scutellum more transverse, being shorter than in ♂; tip of abdomen much broader than in *Blepharipus*. The pedicellate abdomen, which is longer than the head



and thorax together, and the wing characters given above, will easily serve to separate the females of this genus from *Blepharipus*.

Another good generic character is the great lateral extension downwards of the meso-scutum, so that the tubercle is placed unusually far down below the insertion of the wings; and also the very square scutellum, which is as long as broad.

The ♂ differs from *Blepharipus* by its shorter, more transverse, elliptical head, pedicellate abdomen, and in the unusual distance between the eyes, reminding us of *Trypoxylon* and *Mimesa*, whose form this genus imitates. Also in the large size of the hardly carinated clypeus, with its rounded revolute front edge, are good characters. In these respects the European *B. clavipes* agrees with ours. But the present species evidently will have to fall into a lower section of the genus, apart from the European species, which departs less from the type of this group centering about *Crabro*.

Thus in *B. clavipes* the clavate antennæ have throughout, simple cylindrical joints, neither pinched in or expanded. The head is also more like the type of *Crabro*, being more cubical, though differing much still from *Blepharipus*, which connects it with *Crabro*. *B. clavipes* has also the hind legs even longer and slenderer than in the two anterior pairs, especially the tarsal joints.

The great specific differences existing in this genus, show the necessity of large material from both continents in studying the proper generic characters, which we can scarcely as yet hope to render at all perfect.

***Rhopalum pedicellatum*, n. sp.**

♂. Head black, deeply impressed in front of the ocelli; orbits silvery half way from the insertion of the antennæ to the ocelli; clypeal region silvery, clypeus unusually large and broad, front edge revolute. Palpi pale testaceous, antennæ with scape yellow, flagellum with the basal joints brown above, testaceous beneath, terminal joints alternately dark and livid white, two terminal joints dark, tip of last one testaceous. Mandibles pale yellow, piceous at extreme tip, black at base. Surface of the body smooth and highly polished, with very minute shallow punctures; tubercle very small, thin, scale-like, pale yellow; rest of the thorax entirely black; wing-pieces yellow, tegulæ testaceous, this color extending on to the base of the costa of wing; nervures brown; wings clear, iridescent. Thoraco-abdominal ring (propodeum) entirely smooth, not rugose on the sides, with a sparse silvery pubescence on the flanks, not reaching to the obscure semi-ovate or sublunate enclosure.

Tip of fore trochanters, coxæ and fore-legs, yellow, base of femora piceous, hind coxæ yellow. Middle femora brown-black above on the basal two-thirds; tibiæ dark at base; hind coxæ and trochanters whitish, femora entirely black; tibiæ white at base, fuscous at tip beneath externally, with a few minute spinules; fore and middle tarsi white, on the tips of the middle joint a narrow rim of dark; hind tarsi brown, with a large lobular dilatation on the outer side, especially on the basal joint, which is twice broader than the succeeding ones; all the joints are much shorter and stouter than the two anterior pairs of tarsi.

Abdomen black, extreme tip sub-fuscous, with a minute, slight, thin hirsuties.

Length of body, .24; head and thorax together, .10; abdomen, .14 inch.

♀. Head of much the same size and proportions as in *B. minimus*, but the mesial impressed line is less distinct than usual. Eyes and ocelli much the same, vertex covered more thickly with minute hairs; antennal groove broad and flat, highly polished; orbits lined with a fine, sparse, silvery pubescence. In front the head is higher and narrower; the clypeal region narrow, and the clypeus longer and narrower than in any of the other species, being raised, though scarcely carinated, produced into a broad, triangular, acute tooth or lobe, with a minute tooth on each side; mandibles yellowish testaceous, black at base and tips, tridentate. Antennæ clavate, scape slender, thickening towards end, entirely yellow; flagellum black-brown, joints more swollen than in the other species, terminal joints unusually large, obconic, beneath testaceous on terminal half of joints, sometimes forming obscure testaceous rings.

Thorax entirely black, except the yellow tubercle, minutely punctured; meso-scutellum and meta-scutellum black, punctured like the rest of the thorax. Propodeum smooth and highly polished on the enclosure, which is smaller and less distinct than usual; mesial furrow deep, triangular at bottom, not flat; sides of metathorax ridged. Tegulæ and hinge-pieces yellowish testaceous, wings clear, indistinct, nervures black, pterostigma very distinct, black. Femora thickened in the middle, hind pair minutely 4-toothed beneath; outer half of fore and middle femora yellow, posterior pair slightly tipped with yellow; two fore pairs of tibiæ yellow, posterior yellow at base, brown externally; tarsi long and slender.

Abdomen equalling in length the head and thorax together, basal joint long and pedicellate, as long as the abdomen is wide, pyriform,

2d joint triangular, body of abdomen ovate, thickest near the tip, which is rufous, equilaterally triangular, sides ridged, at base wider than long.

Length of body, .20—.26; head and thorax together, .10—.13; abdomen, .10—.13 inch.

Maine, (Packard.) West Farms, New York, (Angus, Coll. Ent. Soc.) Conn., Albany, N. Y., May, (Norton.) Brookline, Mass., (Shurtleff).

This species has been bred from the stems of *Spiræa*, and from the pith of the Rose and stems of *Corcorus japonica*, in hot-houses, by Mr. James Angus. It is easily recognized by its pedicellate abdomen. The antennæ are more clavate than usual, the joints more swollen, terminal joints much larger, the clypeus is produced into a triangular lobe, with a remote minute tooth on each side. The entirely smooth propodeum which has not been before observed in any of this genus, the small size of the semi-ovate enclosure, also the entirely black thorax, and the smooth convex prothorax, rounded on the sides, farther distinguish it. In some specimens the two anterior pairs of femora are testaceous yellow, and striped with brown above.

It is allied to the two European species with pedicellate abdomens: i.e. *C. tibialis* and *C. clavipes*.

***Rhopalum rufigaster*, n. sp.**

♂ Head a little more cubical than in *R. pedicellatum*, not quite so rapidly retreating on the sides, posteriorly; eyes broader, extending farther backwards; front hardly as wide; ocelli a little further apart; in front the surface is deeply impressed mesially, but not so polished as in the other species; it is broad as usual towards the insertion of the antennæ, where is a sparse silvery pubescence; the head is also in front much more transverse and shorter from above, downwards, than in the preceding species. Mandibles yellow, fuscous at the extreme tip; antennæ with the scape much swollen towards the tip, entirely yellow; basal joint of the flagellum very large, barrel-shaped. 3d joint pinched in, so that 2d and 3d are dentate towards the tip, especially the 2d; the 3d being but an obtuse swelling; dark brown, basal joint paler beneath. Thorax much as in preceding species, minutely pubescent, tubercle pale yellow, propodeum a little longer, smooth, minutely pubescent on the anterior surface; no semi-ovate enclosure, smooth obtuse, as usual, mesial furrow well marked. Tips of two anterior pair of coxæ, trochanters and legs entirely yellow; tip of hind coxæ hardly yellow, trochanters yellow, femora black, base of tibiæ pale yellowish, beyond black; base of tarsal joint pale, beyond brown, longer and slen-

derer than in *R. pedicellatum*. Abdomen pedicellated as usual, pedicel deeply grooved on the basal half towards the insertion of the abdomen; anterior half of the third ring reddish, beneath spreading towards the pedicel; edges of the succeeding segments obscurely testaceous, extreme tip rufous, especially beneath.

Length, .20 inch.

♀. Head transversely oblong, deeply impressed as usual in front of the ocelli, clypeal region broad, clypeus a little more than one-half as long as broad, square in front; low, carinated, silvery. Mandibles pale-yellowish testaceous; scape entirely yellow, two basal joints of flagellum testaceous beneath and at tips, brown above, remaining ones brown. Wings and legs as in ♂, but middle pair are testaceous. Abdomen as in ♂, the tip is not carinated, hirsute, scarcely redder than in ♂, beneath almost entirely yellow.

Length, .22 inch.

Illinois, (Coll. Ent. Soc. Phil.).

This species may be easily recognized by its small size, the red ring on the anterior half of the 3d abdominal ring, and the red tip; the male, by its acute clypeus, its pubescent propodeum, and the two anterior pair of legs being yellow. The ♀ differs in the clypeus being square in front, rather resembling *Blepharipus* in this respect.

One of the specimens from Illinois has the abdomen black above, and might at first be referred to a different species, but beneath, the band appears, showing an evident transition to the more usual ringed form.

#### *Desideratum.*

*Crabro* (*Rhopalum*) *claviventris*, Cress., Proc. iv. p. 151. (1865).

Cuba. (Gundlach).

#### Subfamily PEMPHREDONINÆ.

Head subcuboidal and not as long as broad, being transversely oblong, and the sides angulated; the vertex is broad and flat, at right angles to the front, which bends down suddenly; ocelli placed in an equilateral triangle in the centre of vertex. Eyes oval, of moderate width.

Front broad, square, narrowing slightly in front, sunken, sometimes with silvery bristles below the antennæ; which are small, geniculate, inserted moderately far apart below the middle of the front, being intermediate in this respect between *Cerceris* and *Crabro*; the 2d joint is long, and the remaining joints are widely bent at right angles to the 2d, they are thick throughout, hardly thickened towards the tips. The clypeal region is lozenge-shaped, being angulated at the base, and so

produced in front as to be angulated as at the base; the clypeus itself is nearly as long as broad, varying in this respect, not separated from the short, transversely narrow, lateral lobes, which decrease towards the eyes in width, by any suture, though the "foramina" are distinct but small. It is also often raised in the middle, and upturned in front. The labrum is large, produced, triangular revolute, very prominent and well developed, as are the maxillæ and labial palpi. Mandibles large, widening towards the toothed, broad, oblique tips.

The thorax is oval, sub-cylindrical, more elongated than usual. Mesoscutum shorter than broad, angulated and narrowing behind, much as described in the *Crabroninæ*. It only covers the first third of the notal portion of the meso- and metathorax, differing in this respect so much from that of *Crabro*. There is a greater similarity in the form and size of the meso-scutellum and the enclosure of the propodeum than usual, which is raised from the side-pieces, and is transversely oblong. The enclosure of the propodeum is distinct, the margin raised, triangular, from which the sides fall away rather rapidly, but behind incline at a less angle than usual, or the propodeum is more produced (*Passalæcus*) and horizontal, and the tip truncated or bent downwards at a right angle. The meso flank is largest and both very convex, bulging out very much at the sides. The limbs are small and slender, short. The coxæ are rather slender and long; the hind trochanters are rather slender and sub-triangular. Tarsi, especially the 2d—5th, are long and cylindrical, and slightly spined.

The fore wings are shorter than in the three other groups, with the apex rounded, outer margin stout and full. The outer costal is triangular, since the 2d sub-costal segment terminates near the ptero-stigma which is thicker and more conspicuous than usual. There are three sub-costal spaces, the 2d small and quadrilateral, and three median spaces, the 1st is short, small, rhomboidal, the 2d is oblique, its axis being parallel with the outer margin, and the two outer sides being of the same length. The 2d internal is about half as long as broad, being shorter and broader than usual.

Secondaries of moderate width, the discal space is less produced than in the *Philanthinæ*, the lower side or median nervule is much bent upwards, and the recurrent which closes the space, is farther removed from the outer margin than in the *Philanthinæ*.

Abdomen pedunculate; the 1st ring of even width throughout, and varying in length; the abdomen in *Passalæcus* being sub-sessile; remainder of the abdomen oval, sub-cylindrical, the oval portion is shorter

than the head and thorax together; the tip is thickened in ♀, the upper surface flat, and presenting an oblong, flat area, from which the sides fall away rapidly, there being no raised ridge as in the *Philanthinæ*.

**STIGMUS**, Jurine.

*Stigmus*, Jurine, Hym. p. 139. (1804).

♂. Head very transverse, being much shorter than usual and very broad, about one-third as long as broad; eyes very prominent, reaching considerably behind the ocelli; sides of the head behind narrower, contracting and rounded immediately behind, so as to give a trapezoidal form to the head; vertex high and convex, in front of the ocelli depressed below the level of the eyes, which are thus rendered very prominent. Ocelli placed in a narrow acute triangle, below the level of the eyes, with a well impressed mesial line in front. The front converges from the lower edge of the eyes, so that opposite the insertion of the antennæ it is one-fourth narrower than above. Clypeus angular in front, produced, transversely short, lozenge-shaped, with rounded angles, surface not carinate; mandibles long and slender, not dilated towards the acutely bidentate tips; antennæ long and slender, filiform, not thickening at all toward tip; scape thickened; thorax convex, gibbous above, sub-mesial, mesial and parapsidal lines distinct; surface smooth, scarcely punctured; sides puncto-lineated. Legs slender, joints long and slender; wings with the pterostigma unusually large, being three times as large as in *Cemonus* and *Pemphredon*; 3d costal cell triangular, the side remarkably straight, small, as it is encroached upon by the pterostigma; 1st sub-costal hardly twice as long as broad, 2d exactly square, outer side or second sub-costal median recurrent situated on the outer 3d of ring, while in *Cemonus* it is situated on the outer 5th; 2d median very regularly rhomboidal, twice as long as broad, no third cell; 2d sub-median with opposing regularly curved sides, sub-elliptical in form, directly transverse, where in *Cemonus* and *Pemphredon* both sides or recurrences are directed obliquely outwards; no nervules present on the outer half of the secondaries; end of the middle cell rounded externally, as no abortive nervules are thrown off beyond. Propodeum much longer than in either *Pemphredon* or *Cemonus*, but shorter than in *Passalæcus*, with no distinct enclosure, it being obsolete. The posterior portion of the propodeum covered with a net-work of fossulets; abdomen with a long pedicel, as long as the body is broad, ridged, much longer and slenderer than in *Cemonus*, 2d suture somewhat constricted; the body of the abdomen long-ovate, lanceolate, posterior sutures not so impressed as in *Passalæcus*.

♀. Head more cubical, eyes reaching one-half back to hind edge; front edge a little broader; tip acuminate, abdomen broader and shorter.

The smallest genus of the group, except *Spilomena*, which has a sessile abdomen. It is closely allied to *Rhopalum*; in neuration more like *Cemonus* than *Pemphredon*. It differs from both in its minute size. It will at once be recognized, as its name indicates, by its very large pterostigma, the small 3d costal cell, the elongated propodeum, with its sculpturing and obsolete enclosure; its long, narrow abdomen, and minute scarcely grooved tip. The species differ in very slight characters, such as the proportions of the front of the head, and the sculpturing of the propodeum, and all have the white "tubercle" on the flanks of the mesothorax very distinct.

***Stigmus americanus*, n. sp.**

♀. Head black; impressed line in front of the ocelli well marked; clypeus and lower part of the orbits silvery pubescent; mandibles whitish-yellow; tips piceous; antennæ brown above, beneath testaceous on the basal half. Prothorax sharply crested on the posterior margin, convex; notum behind the crest longitudinally striated; meso-scutum smooth and polished; tubercle testaceous yellow; scutum and meta-scutellum smooth. Propodeum covered with a loose irregular network of shallow fossæ, bordered by thin ridges; mesial furrow only present posteriorly where it expands into lozenge-shaped fossæ; flanks of thorax striated, the two most prominent convexities on the flanks of the mesothorax smooth and polished; tegulæ and base of wings pale testaceous. Nervures brown, fore and middle legs testaceous, femora a little darker, all the coxæ and trochanters testaceous at tip; hind femora brown, tibiæ fusco-testaceous at both extremities; tarsi pale testaceous.

Abdomen with a long pedicle, longer than head and thorax together, body of the abdomen a little longer than the thorax; pedicel grooved above and laterally; body of abdomen narrow, ovate, slightly contracted at hind edge of 2d ring of abdomen; smooth and slightly polished; extreme tip rufous.

Length, .16 inch.

Illinois, (Coll. Ent. Soc. Phil.; Norton).

This species is closely allied to, and represents *S. pendulus* of Europe. The antennæ are, however, paler, the basal joints of legs much paler, while the sculpturing of the propodeum is very different.

**Stigmus fraternus, Say.***Stigmus fraternus*, Say, Long's Second Exp. App. p. 340. (1824).*Cemonus fraternus*, Smith, Cat. Hym. Br. Mus. iv. p. 434. (1856).*Mimesa fraternus*, Smith, Cat. Hym. Br. Mus. iv. p. 430. (1856).

♂. Head very transverse, retreating rapidly behind; above highly polished; impressed line in front of ocelli very distinct; silvery below on orbits and clypeal region; front converging rapidly towards insertion of mandibles, which are white, fuscous at tip; clypeus sub-acutely produced in front. Antennæ throughout pale testaceous; scape thickened, short. Thorax smooth, mesial, sub-mesial and parapsidal grooves well marked; meso-scutellum polished like the scutum; meta-scutellum very minutely rugose. Propodeum above with a basal, concave, elliptical area, surrounded by ridges, divided longitudinally by the faintly impressed mesial line, with transverse rugæ interrupted by the mesial line; with shallow fossæ on the sides; posteriorly a net-work of smaller fossæ; tegulæ pale testaceous, as is the base of the wing, tubercle white, nearly contiguous to the prothorax; nervures testaceous on the middle of the ring, blackish on the costa; ptero-stigma black or testaceous. Legs pale fuscous throughout. Pedicel as long as the abdomen is broad, grooved above with sharp ridges on the sides, black, tip fuscous.

Length, .18 inch.

♀. Differs in its more cubical head; eyes scarcely converging towards the front, mandibles larger, antennæ brown on the outer half above, with dilatations extending down on the sides of the joints, anterior legs pale testaceous, femora shaded darker; middle and hind femora black, especially posterior pair, which are not tipped with testaceous or honey-yellow, and the hind tibiæ are dark posteriorly. Abdomen shorter and broader than the ♂; tip very acute, mucronate.

Length, .20 inch.

"Lives in the stem of Syringa," Angus, West Farms, N. Y.

## DESIDERATA.

**Stigmus parallelus, Say.***S. parallelus*, Say, Bost. Jour. Nat. Hist., i, p. 378.

"Mexico," (Say.)

**Stigmus pusillus, Say.***S. pusillus*, Say, Bost. Jour. Nat. Hist., i, p. 378.

"Indiana," (Say.)



**CEMONUS**, Jurine.

*Cemonus*, Jurine, Hym. p. 214, (1807).

♂. Head very transverse, being one-third as long as broad, sides angular, retreating behind; eyes reaching to the middle (in a transverse sense), of the head, aligned posteriorly with the two posterior ocelli, vertex raised, convex, sides of the front converge rather rapidly towards the clypeus, which is short and broad, with the front edge rounded; front of head slightly depressed behind the antennæ, 3d joint of labial palpi rapidly thickening towards the tip; clavate; 4th joint clavate, but longer and more cylindrical; 5th and 6th shorter and cylindrical, subequal in length; maxillary palpi thickened, sub-cylindrical, larger than the two terminal joints of the labial palpi, otherwise as described in ♀.

♀. Head large cuboidal, the sides narrow somewhat behind; ocelli approximate, placed in a triangle; eyes within slightly concave, larger and nearer together than in *Pemphredon*; front narrows towards the clypeal region much more than in *Pemphredon*. Below the antennæ covered with a silvery pubescence; the clypeal region presents a lozenge-shaped area; antennæ a little longer than in *Pemphredon*; the 2d joint is but a little larger than 3 and 4, as in *Pemphredon*, but the 4th joint is much the shorter; the mandibles much of the same size and proportions as in *Pemphredon*. Thorax much as in the other genus, but narrowing more rapidly behind; the propodeum is not so abruptly bent down as in *Pemphredon*; the triangular area above is much shorter and more angulated.

Primaries: 2d costal is not triangular as in *Pemphredon*, but oval lanceolate, 1st s. c. space distinctly angulated on the lower side, rather narrower than in *Pemphredon*. 2d sub-costal s. c. shorter than broad, the sides nearly straight; the outer side of the 2d median space is not curved, and the 3d, or outer space is much narrower than in *Pemphredon*; the 2d internal space is much shorter and broader than in *Pemphredon*; the medio-subcostal recurrent of the secondaries is nearer the middle of the wing than in the above mentioned genus, the nervules within being shorter and more curved. Legs very closely approximate to those of *Pemphredon*, but the forelegs are slender and not so hirsute. Hind tibiæ trigonate, spur longer than in *Pemphredon*.

Abdomen oval, with a rather long curved pedicel, which is longer than in *Pemphredon*; the abdomen itself shorter and thicker; tip of the abdomen smooth.

The differences between the closely allied genera *Pemphredon* and *Cemonus* are best brought out by a comparative description. In the former the front narrows more rapidly, towards the mandibles the clypeal region is more prominent, the sides of the head retreat more posteriorly. The shorter triangular enclosure of the propodeum the shorter abdomen, thicker, and with a longer pedicel, distinguish the present genus.

*Cemonus inornatus*, Harr.

*Pemphredon inornatus*, Say, Long's 2d exp. App. p. 339, (1824).

*Cemonus inornatus*, Harr., Cat. Ins. Mass. p. 68, (1835.)

Smith, Cat. Hym. B. M. iv. p. 434, (1856).

♂. Entirely black. Head with a prominent vertex, polished, shining, with scattered shallow broad punctures, from which arise griseous hairs; anterior ocellus much smaller than the posterior ones; in front of them the surface is puncto-striated; towards the insertion of the antennæ, and on the clypeal region the hairs are longer, dense, silvery, extending part way up the orbits. Mandibles sparingly punctate externally, surface highly polished beneath, a few long setose hairs; antennæ brown towards tips; palpi pale testaceous; surface of the thorax polished, with sparse shallow punctures, as on the vertex of the head; mesoscutellum more densely punctured than the scutum; propodeum with the enclosure very distinct, short and broadly triangular, with a broad mesial furrow gradually narrowed to the apex of the enclosure, with small transverse rugulæ; at base of the enclosure is a row of longitudinal rugæ, which increase in length towards the furrow; this area is bordered on each side by a smooth polished convex ovate-lanceolate oblique limb, which forms the outer side of the triangular enclosure; posteriorly the propodeum is coarsely and thickly punctured on each side of the deeply channeled mesial furrow, becoming less striated towards the insertion of the abdomen. Wings clear, or partially clouded externally, iridescent. Legs black, tarsi sericeous. Abdomen with a pedicel equalling in length the depth of the body of the region; smooth and polished on the sides; punctured and rugose above; terminal rings a little paler on the posterior margin, especially beneath; hirsute and sericeous towards tip.

Length of body, .17—.20 inch.

♀. Differs in the usual sexual characters, possessing a much more cubical head, but with the same sculpturing, as also in the propodeum. The tip of the abdomen has a short deeply sunken fossa or groove, the body of the abdomen is longer, and the pedicel proportionally shorter than in the other sex.

Length of body, .26—.30 inch.

Mass., (Coll. Harris, Norton). Ill., (Norton, Coll. Ent. Soc. Phil.). Virginia and N. Jersey, (Coll. Ent. Soc. Phil.).

In another specimen from Illinois, which is larger than usual, the rugæ on the enclosure are very uniform in size, and converge towards the apex of the enclosure.

It is difficult to convey in words the slight difference existing between the species of this group, which agree so closely in coloration, size and mode of sculpturing. At present I am hardly inclined to consider the last mentioned specimen from Illinois anything more than a variety, though the mode of sculpturing of the thoraco-abdominal ring, or propodeum, usually presents easy and most reliable characters for the discrimination of the species. This species will be recognized by the smooth and polished vertex of the head, which in front becomes rougher, puncto-striated and quite hairy. The silvery pile on the clypeus extends up on the orbits, and suddenly terminates about midway between the ocelli and insertion of the antennæ, and it also differs in the sculpturing of the propodeum. When other species shall have been added, this description will have to be amended. Indeed, for the study of this group, we have as yet the most scanty material, and many conclusions as to the limits of the species, and genera even, will, with time and acquaintance with new forms, ultimately undergo important modifications, and we would here call the attention of observers and collectors to the importance of filling up the gaps in our collections of the members of this most interesting, as it is difficult, group of hymenoptera.

This species breeds in the stem of the Elder, where it tunnels rather irregular holes, in company with *Stigmus fraternus*. My specimens appeared in the middle of May. The specimens of Elder containing these insects were communicated by Mr. James Angus, who has done much towards clearing up the history of our fossorial hymenoptera. A full description, with figures, will be given in a paper on the early forms of the higher hymenoptera, now nearly ready for the press.

#### **PEMPHREDON, Latr.**

*Pemphredon*, Latr, Hist. Nat. Ins. xiii, 1805.

♀. Head unusually large, cuboidal, the sides being parallel. Ocelli placed near together in an equilateral triangle on the vertex; eyes long and narrow; front with straight parallel sides, somewhat hirsute; antennæ rather long and slender, the joints somewhat convex, elongated, sutures distinct; scape with 2d joint as long as the 3d and 4th together.

Mandibles rapidly narrowing towards the tip, tridentate, the middle tooth largest. Thorax oblong, nearly twice as long as broad; prothorax small, narrow; meso-scutum as long as broad, from a little in advance of the middle the sides narrow towards the hind margin, being concave; scutellum short, sublunate. Enclosure of the propodeum very linear; posteriorly abruptly bent down a little before or near its middle, the surface above being flat, sub-triangular and bounded by a low ridge; flanks vertical, straight, somewhat convex, mesially below the insertion of the wings, nearly as broad as long, a little more inclined than the hind flanks; coxæ rather small and short, middle and hind trochanters long and slender. Primaries much as in *Cemonus*. The 2d costal is larger and more angulated. 1st sub-costal space is of the same form as in *Cemonus*, but much longer. 2d sub-costal square, a little longer than broad; in the secondaries the sub-costal recurrent is half way between the outer margin and the origin of the sub-costal nervure. Legs slender, fore femora smooth, with an inner row of long hairs; 1st joint of the tarsi with a thin row of slender spines; hind legs with scattered long light hairs; 1st joint nearly as long as the remainder, shorter by the length of the 4th joint, all the joints are thickly spined within. Abdomen acute ovate, pedicelled, pedicel two-thirds as long as the breadth of the abdomen.

This genus differs not only in the neuriation, but in the square parallel sides of the head, in the clypeal region not being clearly defined and covered with silvery pile, while the antennæ are placed nearer together.

In this genus the propodeum is larger and much lengthened; enclosure with no smooth spaces, but covered with a net-work of fossæ; posteriorly much produced beyond the enclosure. The 3d costal cell is rather triangular, where in *Cemonus* it is oval, lanceolate; the 2d sub-costal vein joins the sub-costal cell within the 3d medio-submedian recurrent, where in *Cemonus* it is either confluent with that nervule, or goes beyond it to the main nervure. *Pemphredon* has a more cubical head, a longer abdomen, and the species are of larger size than in *Cemonus*.

***Pemphredon concolor*, Say.**

*P. concolor*, Say, Long's 2d Exp. App. p. 339. (1834).

*Cemonus concolor*, Harr., Cat. Ins. Mass. p. 68. (1835).

*Pemphredon concolor*, Smith, Cat. Hym. Br. Mus. iv. p. 426. (1856).

*P. morio*, Cress., Proc., p. 486. (1865).

♀. A large specimen in the Harris collection I refer with some doubt to this species, as the individual is evidently considerably larger

than mentioned by Say, though otherwise agreeing with his description.

It may be recognized as being by far the largest species of this sub-family as yet known to us; also by the head being punctured on the vertex as much as on the front. On the meso-scutum the rugæ diverge from the mesial slightly impressed line, so as to become transverse, and then go obliquely backwards; the broad, triangular enclosure of the propodeum, have slightly curved sides, and the limbus, which in *Cemonus* is smooth and polished is here rugulose, while within are large confluent punctures, or irregular fossulets; the declivity of the propodeum is puncto-striated, and on the tip of the abdomen is a long narrow channel, with even, parallel sides.

Length of body, .48; head and thorax, .22; abdomen, .26 inch.

"Dublin N. H. Leonard," (Harr. Coll.).

I cannot as yet perceive any valid characters sufficient to separate the specimen from New Hampshire and that labelled *P. morio*, Cresson, from Colorado. In that last specimen, the abdomen is much contracted, the tip is drawn in, and thus the groove is partially concealed; owing to this, the abdomen in the type specimen, loaned me by Mr. Cresson, seems shorter than it really is, and the pedicel proportionally longer—but I think the two species will have to be united.

#### **DIODONTUS**, Curtis.

*Diodontus*, Curtis, Brit. Ent. ii. p. 496. (1836).

♀. Head large, very cubical, with square edges, and eyes much as in *Passalæcus*, but a little broader, though much farther apart on the vertex; ocelli very contiguous, as in *Passalæcus*, but not so prominent. Front much shorter and broader than in the succeeding genus, antennæ inserted much farther apart, and nearer the middle of the front, which is more concave at the origin of the antennæ than usual; clypeus convex posteriorly, surface convex, smooth and polished, acutely tridentate on the front edge; central tooth largest; labrum exerted, edge broad emarginate, distinctly bidentate; mandibles very long and slender, narrow, tips not widened, blunt, scarcely bidentate, tips crossed; lower edge with a few long coarse setæ. Palpi long narrow cylindrical, closely resembling those of *Passalæcus*, but the joints are a little shorter and considerably stouter, especially the 4th joint of the labial palpi. Antennæ much as in *Passalæcus*, but the scape is much shorter and thicker, flagellum equally clavate. Thorax as in *Passalæcus*, prothorax angular on its sides, mesonotum much more convex, smooth and polished; size of scutellum and meta-scutel-

lum more equal than in *Passalæcus*, where there is a greater disproportion, being much shorter and transversely linear. The form of the propodeum is intermediate between that of *Cemonus* and *Passalæcus*, being much shorter than in the latter, and very rugose, with no distinct enclosure at the base, and with no well marked mesial furrow. The structure of the wings allies it closely to *Passalæcus*; the stigma is very distinct; the third costal (or radial) cell is less triangular than in the succeeding genus, but much more so than in *Cemonus*; 2d subcostal (cubital) cell is very short, one-half as long as wide, subtrapezoidal; 2d median cell distinctly rhomboidal, where in *Cemonus* the inner side (or 1st recurrent) is curved, and not parallel to the outer oblique side, (or 2d recurrent), being much as in *Passalæcus*; 3d median cell shorter and broader than in *Passalæcus*, since the outer side is longer and more sinuate.

Abdomen a little longer than the thorax, where in the succeeding genus the two are very nearly equal in length; subsessile, thickest near the base; short ovate, rings not so contracted at the sutures as in the two other genera, being full and very convex above; tip acute, with a rather broad flattened well marked, triangular area.

This genus may be readily known by the triangular supraanal flattened area, which is large and conspicuous; by the striated clypeus and exerted bidentate labrum, from which the generic name is derived. The want of the usual pubescence on the front of the head, the very long slender mandibles, not increasing in width as in *Passalæcus*, where the head is shorter in front than in that genus, will distinguish it.

But a single species has yet been detected in this country.

*D. americanus*, n. sp.

♀. Body black, shining and polished, clypeus smooth and shining; antennæ entirely black; scape black; mandibles white, reddish at the tip; palpi dark fuscous; surface of the head smooth, polished, with much fewer minute shallow punctures than usual, scarcely pubescent, except on the orbits, where it is thinly so. Meso-scutellum, with the mesial and sub-mesial lines distinct, parallel, very contiguous, surface anteriorly more densely and minutely punctured than on the disk; meta-scutellum more fully colored than scutellum; propodeum with no distinct enclosure, or distinct mesial furrow; anterior portion with no unequal parallel straight lines proceeding from the base; posteriorly an irregular net-work of shallow broad fossulets. Tegulæ and insertion of the wings testaceous; nervures blackish, pterostigma black;

wings iridescent; flanks of the thorax distinctly corrugated on the more convex surface, smooth and shining in the depressions. Legs black, tarsi dark fuscous; tibiae with two rows of spinules; tibial spurs large, testaceous, and tarsal joints more than usually spinulate at tips. Abdomen black, smooth and shining, supraanal area one-half as broad at base as long.

Length, .22 inch.

Brunswick, Me., (Packard).

**PASSALÆCUS** Shuckard.

*Passalæcus* Shuck., Essay on Fossorial Hymenoptera, p. 188. (1837).

Head shorter than in *Cemonus*, and much more cubical, being transversely oblong, instead of square; eyes rather larger than in *Pemphredon* and *Cemonus*, oval; ocelli placed on the vertex in a flattened equilateral triangle. Front broad, narrowing very considerably in ♂, in ♀ of even width above and below, somewhat concave and slightly furrowed in the middle. Antennæ placed farther apart than in *Cemonus*, short and thickened, the joint continuous, not convex as in *Cemonus*, 3d joint bent at right angles to the 2d, which is long; clypeal region distinct sub-lozenge shaped, naked, clypeus raised along the middle, slightly indenting the epicranum at the base of the antennæ, and the contour of the base is similar to that of the front, which at the base of the labrum is tridentate. Labrum large, distinct, porrect, extending much beyond the clypeus; it is triangular, the sides a little incurved, the point rather blunt; mandibles large, crossing one another and widening very much towards the tips, which are broad oblique, unidentate, edge very oblique, crenulated.

Thorax long and narrow, twice as long as broad; prothorax small and narrow, produced in front. Meso-scutum very convex, curved down in front, much shorter than broad, scutellum moderately long, propodeum greatly produced. Enclosure transversely linear; scutellum longer, much longer than broad. Middle flanks scarcely horizontal, while the hind flanks are inclined. Coxæ stout; trochanters subtriangular. Primaries very closely resembling *Cemonus*, but the wing is shorter; the 2d costal cell is shorter and more angulated; the 1st subcostal is shorter; 2d much shorter than broad; 1st median cell irregularly rhomboidal; the 3d or outer cell is much narrower; the 2d internal cell is broader and shorter than in *Cemonus*. Secondaries much narrower towards the apex than in *Cemonus*, the outer margin being straighter and more oblique. The medio-costal recurrent is much farther from the outer margin than in *Cemonus*, and their cells differ throughout.

The legs are much slenderer and smoother, the fore femora long and slender, fore tarsi slenderer and more slightly spined, hind tarsi minutely hirsute. 1st joint much shorter than in *Cemonus*. The shorter head, large mandibles, especially in ♂, resembling those of *Eumenes*, the prominent revolute visor-like labrum and smooth front, the horizontality and great extent of the meso-thoracic flanks, compared with the inclined flanks of the meta-thorax, the differences of the wing, as stated above, and the slender, smoother legs, and especially the subsessile abdomen, with its nearly cylindrical and obtuse tip, separate this from *Cemonus* and *Pemphredon*.

***Passalæus mandibularis*.**

*Pemphredon mandibularis*, Cress., Proc. iv. p. 487. (1865).

Our eastern specimens from Maine and Massachusetts, (Norton), do not differ from specimens from Colorado Territory, (Coll. Ent. Soc.) It seems to be a common and widely distributed species.

***Passalæus annulatus*.**

*Cemonus annulatus*, Harr. Cat. Ins. Mass., p. 69. (1835).

*Pemphredon annularis*, Say, Bost. Jour. Nat. Hist., i, p. 379. (1836).

*Pemphredon annulatus*, Smith, Cat. Hym. B. M. iv. p. 429. (1856).

♂. Front converges more sensibly, and is slightly contracted opposite the insertion of the antennæ; clypeus and orbits slightly hirsute; clypeus subacute; mandibles small, white, much smaller and shorter than in ♀. Antennæ with the scape stouter and shorter than in ♀, white on the basal half, the remainder fuscous; joints of the flagellum fuscous annulated with testaceous white. Otherwise like the ♀.

Length, .19 inch.

♀. Head narrow, more narrow than in *P. mandibularis*, more acute, more distinctly carinated and dark; clypeal region smooth, just above obsoletely sericeous, more naked than in *P. mandibularis*; mandibles white, of the usual form, fuscous on edges and tip; palpi pale testaceous; antennæ more clavate than in *P. mandibularis*, scape whitish, basal joint fuscous, remainder brown-black, thorax smooth, very minutely punctured; lower edge of meso-scutum with a marginal row of distinct short rugæ, directed inwards. Prothorax slightly sericeous. Propodeum confluent punctured with fossulets, with a slightly marked mesial furrow; on the flanks are longitudinal prominent ridges, with smaller intermediate transverse striæ; more posteriorly, with minute fossulets between the unequal irregular transverse striæ. Nervures of the wing ferruginous; pterostigma blackish. Fore and middle legs entirely fuscous, including the trochanters, hind trochanters fuscous, femora black, fuscous at tip, which is concolorous with the rest of the



leg. Abdomen as in the preceding species, slightly pedicelled, edges angular, segments behind slightly contracted towards the sutures, black, extreme tip grooved, channel not so large and distinct as in *P. mandibularis*.

Length, .20—.22 inch. Indiana, (Say), Illinois, (Coll. Ent. Soc. Phil.). Mass., (Coll. Harr.).

Differs from the other species by its much smaller size, its fuscous legs, narrow head, very smooth front, which is but slightly sericeous. The whitish rings on the antennal joints of the male will readily distinguish the species, besides its small size.

**PSEN** Latr.

"*Psen* Latr., *Precis*. (1796)."

♂. Head very transverse, short, nearly one-half as long as broad; vertex much compressed from before backwards, so that the vertex is high, very convex, and the ocelli are very prominent, contiguous, arranged in an equilateral triangle. A slight raised carina between the origin of the antennæ; the sides of the front contract narrowly towards the clypeus, which is shorter than in the ♀. Entire front, from just below the ocelli, thickly pubescent; antennæ very long, filiform, scarcely clavate; joints long, suture well marked. Thorax and wings as described in ♀; tip of the abdomen acute.

♀. Head subcubical, one-half as long as broad, corners subangular, vertex compressed antero-posteriorly, so that the vertex is very high, convex and with prominent ocelli, which are arranged in an equilateral triangle, situated on the vertex. Eyes larger than usual, very prominent, extending farther backwards than usual behind the middle (in a transverse sense) of the head. A mesial raphé but no depression in front of the anterior ocellus. Sockets for the insertion of the antennæ large and deep, surrounded by high ridges; sometimes between these is a high crowded carina cleft mesially and longitudinally. Front contracts rather rapidly towards the middle and opposite the insertion of the antennæ, which are inserted very high up; in front it forms a broad, slightly convex region, which has parallel sides; and a little below the middle is the posterior edge of the clypeus, which has a very convex posterior edge, and is in front unusually straight, but slightly convex. Labrum with a few long setose hairs arranged in a semi-circle, those in the middle being much larger than on the sides. Mandibles broad at the base, triangular, tips incurved, very narrow and unequally bidentate; lingua terminates in two lateral terminal lobes, not very deeply cleft; antennæ scarcely elbowed, scape large and

stout, much thickened towards the ends, joints large and heavy, third joint trapezoidal in outline, subglobular; flagellum unusually clavate, thickened especially just before the tip.

Thorax short and thick; prothorax short, very narrow transversely, with a ridge above, which is interrupted by a slight mesial impression; meso-scutum broad and short, impressed line very faint, submesial ridge obsolete; parapsidal groove quite distinct. Scutellum smooth, just twice as broad as long; meta-scutellum short, very transverse and puncto-striated. Pterostigma small, third cell not triangular as in *Mimesa*, but irregularly oval lanceolate, 2d subcostal cell nearly triangular, as the upper or anterior side is much contracted, since the two subcosto-median recurrents closely approximate, while in *Mimesa* the area is regularly trapezoidal; second median cell much more produced than in *Mimesa*; outer side of 2d submedian cell is much more curved than in *Mimesa*; propodeum much as in *Mimesa*, scarcely differing, the enclosure being very distinctly and acutely triangular, equilateral and acutely pointed; posteriorly it is on each side full and convex, rather short and well rounded downwards. Legs not so stout as in *Mimesa*; tarsi much slenderer.

Abdomen with a long and slender pedicel, as long as the breadth of the abdomen itself, the body of which is a little longer than the head and thorax together, segments slightly emarginate, contracted at the sutures, tip very acute, point slightly channeled above.

The species of this genus are generally almost entirely black. Compared with *Mimesa*, the head is much more cubical, antennæ less clavate, eyes narrower, front broader, clypeus less rounded on the front edge, thorax more spherical, abdomen much broader, the tip of the abdomen more or less grooved in most of the species, while in *Mimesa* it is flat and not grooved at all. It is thus much more closely allied to *Mimesa* than the genera *Pemphredon*, *Cemonus* and *Stigmus* or *Pas-salæcus*, by its more transverse head, and cephalic characters enumerated above, such as the transverse rather flat sublunate clypeus, the vertex, which is antero-posteriorly compressed, and the very clavate antennæ. In the wing-characters it also, with *Mimesa*, differs in possessing an additional subcostal cell, in the greatly lengthened median cell, and the enlarged and broad 2d submedian cell, which thus shows its analogy with the Nyssonidæ. The two genera by their affinities with the Nyssonidæ, connect the Crabronidæ with that family, and afford an easy passage into the former, as seen in the singular triangular enclosure on the propodeum, which differs very considerably from

the form of this area in the Philanthinæ and Crabroninæ; also in the stoutly jointed and very clavate geniculate antennæ, characters which prevail in the Nyssonidæ, Larridæ, Sphegidæ and allied fossorial groups, together with the peculiar neuriation and form of the front of the head, reminding us throughout of *Oxybelus* and *Nysson*.

The neuriation of *Psen* differs very considerably in the different species. Thus *Psen ater* Fabr. presents notable differences in the neuriation from both of the two species described below, since the two median cells are greatly shortened, thus imparting a very different facies to the entire character of the neuriation. This shows how cautious we must be in the use of these alary characters in our generic diagnoses. The eyes in *Psen* are much larger than in *Pemphredon*, *Cemonus* or *Passalæcus*.

Compared with the other sex, the male of this genus has a much more transverse head, which rapidly contracts in width posteriorly; the vertex is much more elevated, clypeus shorter, antennæ much longer, subfiliform, and the legs are slenderer, while the abdomen has a longer pedicel.

### *Synopsis of the Species.*

#### *A. Front silvery, antennæ black.*

♂. Black, tarsi whitish.

♀. Black, pedicel shorter than the width of the antennæ.....*P. leucopus*, Say.

♂. Pedicel more than  $\frac{1}{2}$  as long as the abdomen, feet fus-cous.

♀. Pedicel as long as the abdomen is wide, species larger than the preceding.....*P. niger*, Pack.

♀. Abdomen very long and flattened, sutures very distinct.....*P. elongatus*, Pack.

#### *B. Front golden.*

♀. Antennæ rufous beneath, body stout.....*P. chalcifrons*, Pack.

♀. Of large size, flanks golden; ♂ basal abdominal rings red on the hinder edge.....*P. fuscipes*, Pack.

#### *Psen leucopus* Say.

*Psen leucopus* Say, Descr. New Species N. Amer. Hym. Bost. Journ. Nat. Hist. 1, May, 1837, p. 370.

♂. Black, head rather sparsely punctured above, and polished; below, thickly pubescent, silvery; scape rather hirsute, eyes smaller and front much narrower, with more space between the eyes and supra clypeal region, which area is flatter than in ♀. Mandibles and antennæ black. Thorax and propodeum as described in the ♀, but the mesial furrow of the latter is much deeper, and posteriorly very broad and sunken, forming a deep channel, on each side of which rises the somewhat tumid sides; sides of thorax sericeous, which are

covered with a net-work of shallow fossulets; pedicel laterally grooved; legs black, coarsely, thinly long sericeous; tarsi pale, uniformly whitish testaceous, a little fuscous towards ungues; posterior edge of the abdominal segment finely hirsute.

Length of the body, .12 inch.

Western Virginia, Ridings, (Coll. Ent. Soc. Phil.).

♀. Head cubical, angular at the sides, black, polished; ocelli of the usual distance apart, arranged in an equilateral triangle; punctures sparse, shallow, surface not lineated, highly polished, slightly lineated between the ocelli and the insertion of the antennæ, which are slightly clavate, black, but rather broad; v-shaped, mesially cleft, ridge between the insertion of antennæ unusually prominent; hairs of labrum coarse setose, arranged in a semicircle, gradually shortening on the sides; mesoscutum polished, with sparse shallow punctures, as is the scutellum; meta-scutellum unequally and indistinctly punctostriated. Enclosure of propodeum equilaterally triangular, with four rugæ on each side of the lozenge-shaped mesial furrow, sides posteriorly curved, with a coarse, distinct net-work of fossulets, tegulæ externally testaceous, wings clear, nervures dark piceous; legs very uniformly brown, fore tarsi testaceous-brown, middle tarsi darker; hind tarsi much darker, concolorous with the tibiæ; while the whole body is coarsely sericeous, the legs are finely so. Abdomen smooth, slightly sericeous, sutures well impressed, wings being slightly emarginate, pedicel as long as the depth, but not the breadth of the abdomen, grooved laterally above and beneath, highly polished. Tips narrow, compressed, three times as long as broad, rather deeply grooved.

Length of body, .28 inch.

Penn., (Coll. Ent. Soc. Phil.). New York, (Norton).

This species represents *Psen ater* Fabr. of Europe, resembling it in its entirely black body and dark extremities; its silvery sericeous front; the want of striæ on the vertex of the head, and on the thorax, its coarsely rugose propodeum, the peculiar grooved abdominal tip, the dark tarsi and antennæ, and the large v-shaped prominence between the origin of the antennæ, wherein it resembles *Cerceris*, will sufficiently distinguish it.

*Psen niger*, n. sp.

♂. Head transversely oblong; sides rounded posteriorly; vertex slightly elevated, ocelli arranged in a low triangle; eyes prominent; vertex coarsely and densely punctate, scarcely polished; front densely pubescent from just above the insertion of the antennæ to the edge

of the clypeus, which is subtriangular, and above, very broadly so; front edge transverse, nearly straight, the front contracts rather rapidly towards the clypeus; between the insertion of the antennæ a slight mesial carina; antennæ subclavate, almost filiform, black, mandibles black, hirsute at base. Prothorax well carinated on the anterior edge, behind densely hirsute; mesoscutum dull, densely puncto-lineated; mesial and submesial grooves distinct; meta-scutellum hirsute; propodeum with a broadly triangular, very transverse enclosure, with three high ridges on each side of the mesial line; bottom of the fossæ broad and highly polished; mesial furrow very small, contracted, sublozenge-shaped, nearly obsolete beyond the enclosure, with irregular transverse rugæ at bottom; posteriorly the rather tumid sides are covered with a coarse net-work of broad shallow fossulets, with a long thin, fine hirsuties. Tegulæ and base of wings dark brown, nervures black; pterostigma black-brown, legs black, base and tip of tibiæ brown-black; tarsi fuscous, rather light. Abdomen nearly twice as long as the head and thorax together; pedicel longer than the width of the abdomen, grooved inside, polished; the body of the abdomen oval acute, longer than the head and thorax together, being of unusual length; sutures very slightly impressed; hind edge of the rings slightly emarginate, hirsute posteriorly; edge of tip slightly emarginate on the sides; penis exerted, upcurved.

Length of body, .18; head and thorax, .07; abdomen, .11 inch.

The ♀ differs in its more cubical head, clavate antennæ, longer carina, thinner pubescence on the front, which is wider, in the more polished surface of the head and thorax; the propodeum is less striated, and the legs are uniformly black-brown, the tarsi scarcely paler, tibial spur white.

Length of body, .18; head and thorax, .08; abdomen, .10 inch.

Virginia, Ridings, (Coll. Ent. Soc. Phil.).

Differs in its larger size, the unusually long pedicel of the abdomen, the puncto-lineated surface of the thorax, especially marked in the male, and which does not usually occur except in Say's *P. mellipes*, which he states is longitudinally striated. It also differs in the 2d subcostal cell being broader and squarer, and less trapezoidal than usual.

*Psen elongatus*, n. sp.

♀. Head subcubical, sides retreating more posteriorly than the two preceding species; vertex high, convex; ocelli placed in an equilateral triangle, not very contiguous; front much broader than usual; eyes

narrower, clypeal region coarsely pubescent, silvery, clypeus and labrum as in *P. leucopus*; mandibles black, palpi piceous, dark; antennæ black at base, (remainder wanting in the single specimen at hand). Scutum and scutellum smooth and polished, with scattered shallow minute punctures. Propodeum with a short broad flattened triangular enclosure, not so distinct as in the other species, with four rugæ on each side of the mesial furrow, which is broad, well marked, with high sides, and more regularly diamond-shaped than in the two preceding species, with two or three transverse rugæ at bottom; posteriorly the sides of this segment are suddenly tumid, owing to the much depressed sunken mesial furrow, which is deeply excavated, and bounded by ridges; surface coarsely rugose, with broad, shallow fossæ. Wings pale, nervures dark-brown; tegulæ brown, uniformly fuscous at base. Abdomen very elongate, long and narrow, with parallel sides, oblong, oval, much flattened, sutures very distinct, pedicel longer than the abdomen is wide, grooved laterally, smooth and polished, entirely black, tip submucronate, acute, upper surface plane, not grooved.

Length of body, .26; head and thorax, .10; abdomen, .16 inch.

Illinois, (Coll. Ent. Soc. Phil.).

At once easily recognized by the long-pedicelled abdomen which is oblong ovate, greatly flattened, mucronate, sutures deeply impressed; its long pedicel, and black body, also by the head retreating posteriorly more than usual, with a more convex, elevated vertex, and by the singular mode of sculpturing of the posterior part of the propodeum.

***Psen chalcifrons*, n. sp.**

♀. Head black, much narrower transversely than in *Psen niger*; vertex more convex; ocelli more contiguous and more prominent, scarcely pubescent above the insertion of the antennæ; a slight cleft, v-shaped carina between the origin of the antennæ; below covered with a peculiar brassy, silvery pubescence, purely bronzen when seen in some lights; mandibles entirely black; scape of antennæ black; flagellum very clavate, pale reddish beneath, extending onto the sides. Surface of the thorax scarcely polished, rather densely, but finely puncto-striated; scutellum polished, with a few slight shallow, scattered punctures; meta-scutellum with fine parallel rugæ, more regular and better marked than in *P. niger*. Enclosure on the propodeum broad, subequilateral, extending lineally to the insertion of the abdomen, with four regular thin distinct parallel rugæ, slightly oblique and directed outwards, parallel with the walls of the mesial furrow, which posteriorly, rapidly expands into a lozenge-shaped area; sides of the propo-

deum convex, somewhat tumid, covered with a fine net-work of irregular rugæ, not so coarse as in the preceding species, and covered with denser pile than in the other species. Tegulæ testaceous, insertion of wings fuscous and piceous, wings clear iridescent. Femora black, fore tibiæ reddish; all the tarsi uniformly testaceous, reddish, slightly sericeous; extreme base of hind tibiæ reddish, remainder black; tibial spurs concolorous with the tarsi. Pedicel of the abdomen grooved above; laterally, smooth and polished, as is the abdomen itself, the tip of which is broad spatulate, surface plain, not grooved as in *P. niger*.

Length of the body, .26 inch.

Illinois, (Coll. Ent. Soc. Phil.).

Its reddish antennæ, its bronzen front when seen in certain lights, the reddish under side of the antennæ, reddish fore tibiæ, and punctolineated mesoscutum, and the much shorter head, narrower transversely with a more convex vertex, more prominent ocelli, and its plain spatulate abdominal tip will sufficiently distinguish this species from the preceding.

*Psen fascipes*, n. sp.

♀. Head broadly transverse, vertex elevated and convex, very minutely punctured on the vertex, which is smooth and polished, with a well marked prominence between the insertion of the antennæ; front broad, with an unusually deep golden dense pubescence, darker at base of the clypeus; antennæ with the scape black, flagellum pale reddish beneath, black-brown above, tip reddish above. Prothorax well crested, pubescent behind; meso-scutum minutely punctured, polished; mesial and submesial impressed lines distinct, meta-scutellum minute; propodeum with about six fine rugæ on the enclosure on each side of the well marked mesial line, which is distinctly lozenge-shaped, posteriorly interrupted by three high distinct ridges, and still more posteriorly with distinct, though rather fine lines, diverging from the mesial furrow, hirsute. Tegulæ testaceous, nervures with ferruginous nervures, paler than usual. Femora brown, sericeous, fore and middle pairs tipped slightly with ferruginous; tibiæ concolorous with the femora; tarsi pale fuscous, thickly pubescent; hind tarsi concolorous with the fore tarsi. Body of the abdomen longer than the head and thorax together, being unusually long and slender, ovate lanceolate, pedicel nearly as long as abdomen is wide, grooved deeply laterally, highly polished; abdomen with the rings slightly coarctate, sutures well impressed, hind edge of 2d, 3d and 4th rings obscurely and narrowly blood red; tip acute, with a narrow, long, subtriangular, well marked flattened surface.

Length of the body, .36; head and thorax, .22; abdomen, .14 inch. Mass., (Sanborn).

Easily recognized by its unusually large size, its long pedicel, even when compared with *P. niger*, in which species it is remarkably long; by its unusually deep golden pubescence, not only on the front, but on the orbits behind the eyes, and on the flanks of the thorax; by the blood-red hind edge of the three basal abdominal rings, and by the dark tibiæ and pale fuscous tarsi, the well marked rugæ, six on each side of the mesial furrow, which is interrupted by three transverse rugæ, of which the first is the largest.

## DESIDERATUM.

*Psen mellipes*, Say.

*Psen mellipes*, Say, Jour. Bost. Soc. Nat. Hist., i. p. 369. (1836).

## MIMESA Shuck.

*Mimesa*, Shuck., Foss. Hym. p. 288. (1837).

Head very transverse, scarcely one-third as long as broad, a little wider than the thorax, vertex elevated, very convex, ocelli arranged in an equilateral, rather low triangle; eyes large and prominent, more so than in *Psen*; the front contracts much more in the middle; being narrower above and expanding more at the clypeus, which is oval elliptic, surface convex, rounding in front, and proportionally larger than in *Psen*; with a conspicuous interantennal prominence. Antennæ clavate, scape stout and thick, flagellum clavate, rarely filiform, joints sometimes subdenticulated beneath towards the base. Thorax much as in *Psen*, but more pubescent, with the propodeum more produced posteriorly; enclosure broader, triangular; posteriorly the propodeum is much produced behind it. The sculpturing varies very much, there are more usually 4 rugæ on each side of the mesial furrow, which are more or less distinct, and posteriorly form lines radiating towards a net-work of irregular rugæ. Legs much longer and joints slenderer; the pterostigma is larger and more distinct than in *Psen*; the 2d subcostal cell also is much larger and more broadly trapezoidal, and the 2d submedian cell is much larger, and the outer side straighter, not curved as in *Psen*.

The abdomen varies much in length, in some species being twice as long as the rest of the body; pedicel from one-half to two-thirds as long as the abdomen is wide, usually smooth and polished, grooved laterally, body of the abdomen ovate, or more usually ovate-lanceolate; rings not coarctate; sutures slightly impressed, tips pointed, hirsute, with an upturned penis.



♀. Differs in its more cubical head, which is still much less so than in *Psen*, its more clavate antennæ, less elevated vertex and clypeus, and a little shorter abdomen than usual, the tip of which has a broad spatulate flattened supraanal area.

All the species have reddish antennæ, and the base of the abdomen is broadly banded with red, and the feet are pale reddish.

The genus differs from *Psen* by its broader and shorter head, longer body, much more clavate antennæ, the much longer propodeum and abdomen, and the ♀ tip is broad and flattened, where in *Psen* there is a linear narrow groove. The 2d subcostal (cubital) cell varies greatly both in *Psen* and the present genus, and but little reliance, aside from the other characters enumerated above, can be placed in it.

### *Synopsis of the Species.*

#### A. 2d—3d Abdominal rings red.

♀. Antennæ red, black stripe above; front silvery...*M. argentifrons*, Cress.

♀. Antennæ black above, red beneath; front golden...*M. Cressonii*, Pack.

♀. 2 basal abdominal rings red only on hind margin...*M. basirufa*, Pack.

♂. 2 basal abdominal rings red, denticulated.....*M. denticulata*, Pack.

♂. 2 basal abdominal rings very long, pale red, tip red beneath, sub-denticulated.....*M. monticola*, Pack.

♀. Pedicel of abdomen very short, half as long as abdomen is wide, propodeum very finely striated.....*M. proxima*, Cress.

#### B. Part of one abdominal ring red. Antennæ red at tip, front silvery, abdomen very long, pedicel usually as long as the abdomen is wide.

♂. Body shorter than usual, pedicel shorter than abdomen is wide.....*M. borealis*, Smith.

♂. Antennæ very clavate, with a narrow red ring, pedicel half as long as abdomen is broad.....*M. singulata*, Pack.

♂. Two-thirds of the 3d abdominal ring red; abdomen very long, sutures well defined, cylindrical, twice as long as rest of the body.....*M. uniolineta*, Cress.

#### *Mimesa argentifrons* Cresson.

*M. argentifrons* Cresson, Proc. Ent. Soc. Phil., June, 1865, p. 487.

Col. Terr.; Illinois. (Coll. Ent. Soc. Phil.)

Some specimens from Illinois are a little smaller, antennæ much darker, propodeum not so coarsely marked as usual; they also differ from the Colorado specimens in having the 4th joint of abdomen two-thirds black, where in the types from Colorado only the posterior one-quarter is black.

**Mimesa Cressonii** n. sp.

♀. Head much as usual, striated behind the ocelli, which are farther apart than usual, situated in a low equilateral triangle; eyes smaller above, and farther apart than in *M. argentifrons*; surface of the vertex densely, but minutely punctured, polished, not hairy; front widening equally above and below, not so broad as in *M. argentifrons*; clypeus narrower and more convex on the front edge, surface more convex than in the preceding species, tubercle between the antennæ much as usual; below the ocelli the front is somewhat bronzen yellowish silvery, with much fine pubescence just in front of the ocelli; mandibles black; antennæ very clavate, brown above, and pale reddish on the sides and beneath, scape black, basal joint of flagellum black at base beneath. Prothorax much higher and larger than in *M. argentifrons*, with a delicate, but dense line of pubescence just behind the crest, surface of thorax minutely punctured, polished; meta-scutellum hirsute.

Propodeum with triangular enclosure striated, striæ proceeding uninterrupted to the posterior part of the propodeum, where they are fine and regular, parallel, diverging from the mesial furrow; posteriorly the pubescence is long and hirsute, silvery-yellow; with no distinct mesial furrow as in *M. argentifrons*. Fore legs dark fuscous, two posterior pairs black; two fore femora slightly reddish at tip, and tibiæ reddish at tip and base; tarsi reddish; hind tarsi dark brown, paler towards tip of joints, wings clear iridescent; tegulæ testaceous, nervures dark brown, costa ferruginous. Abdomen with the pedicel a little longer and slenderer than in *M. appressifrons*, 2d ring entirely red; 5th red at base, rest of tip black; terminal segment dull colored, very densely punctured, tip with a very slightly marked broad flattened area, with a short pubescence, area not, however, so well marked as in *M. appressifrons*.

Length, .35—.45; head and thorax, .18; abdomen, .27 inch.

New Jersey, (Coll. Ent. Soc. Phil.); New York, (Norton).

As indicated on the label, by Mr. Cresson, this fine species is undescribed, and I take pleasure in naming it after him. By its large size, bronzen front, finely striated propodeum, its antennæ with the under side red; and by the entirely red three (2d—5th), basal rings of the abdomen, and the very slightly flattened tip, it will be readily recognized. *M. appressifrons* differs in the rather coarse net-work of fossulets on the propodeum, in the mesial furrow, and having the base of the 2d abdominal ring black, while the front of the head is much narrower.

***Mimesa basirufa*, n. sp.**

♀. Head much as usual, front silvery, vertex more coarsely punctured than in *M. Cressonii* or *M. argentifrons*; the form of the clypeus more closely resembles that of *M. argentifrons*; antennæ slenderer than in *M. Cressonii*, black above, rufous beneath; mandibles black. Thorax as in *M. Cressonii*; propodeum with a distinct enclosure, with longer, coarser rugæ than in *M. Cressonii*, and posteriorly with coarser striæ, arranged in the same manner as in the other species, but less hairy. Legs much as usual, but the tarsi are darker than in *M. Cressonii*, and the nervures a little blacker. Abdomen long and slender, pedicel shorter and broader than in *M. Cressonii*, surface deeply grooved, without the usual mesial ridge above, which is present in *M. Cressonii*; rings black, except the hind margin of the 2d ring; tip not so hirsute as usual, supraanal area better marked and more coarsely punctured than in the other species.

Length, .36 inch. Maine, (Coll. Harris).

Differs from *M. Cressonii* by the two basal rings of the body of the abdomen being red only on the hind margin, by its deeply furrowed and broad pedicel, the slender antennæ, and the coarser striation of the propodeum.

***Mimesa denticulata*, n. sp.**

♂. Head much as in *M. Cressonii*; ocelli placed in a higher triangle, surface of vertex much the same, but more distinctly puncto-striated; front densely silvery, a little longer than in *M. Cressonii*. Mandibles black, reddish at tip; antennæ more clavate towards tip than in *M. Cressonii*, tip much thickened; scape black, flagellum entirely pale red, darker above except on basal joint beneath, 2—6 joints slightly produced tooth-like beneath. Thorax much as in *M. Cressonii*, flanks striated, densely silvery hirsute; polished and thinly punctured. Propodeum with enclosure distinct, finely striated, about six ridges on each side of the mesial furrow, which is small but distinct, lozenge-shaped; posteriorly with fine diverging striæ on each side of the broad and deeply channelled mesial furrow, posteriorly silvery hirsute; tegulæ testaceous; pterostigma ferruginous, nervures darker. Femora black sericeous, fore and middle pair tipped with paler reddish; fore tibiæ pale reddish, middle pair darker, sericeous, hind pair broadly fuscous at base, and narrowly so at tip; tarsi darker, posterior pair darker, joints tipped with fuscous; flanks thinly pubescent. Body of abdomen nearly twice as long as head and thorax together, unusually long and slender, narrow oval-lanceolate, smooth and polished, becom-

ing sericeous towards the tip; sutures well impressed; segments with a dense fine short hirsuties; pedicel and anterior part of 2d ring black, 3d and 4th red, the remainder black, 5th ring red on the posterior edges.

Length of body, .32; head and thorax, .12; abdomen, .20 inch.

Illinois, (Coll. Ent. Soc. Phil.). New York, (Norton).

This species will be easily recognized by its denticulated, very clavate, red antennæ, its long slender body, the distinct though small mesial furrow on the propodeum, and the two anterior pair of tibiæ which are fuscous; the front is silvery, straighter and narrower than in *M. Cressonii*.

*Mimesa monticola*, n. sp.

♂. Head broad and short, vertex much elevated, and very convex, ocelli prominent, arranged in a low triangle; surface minutely punctate, though not densely so, polished and shining, slightly and finely hirsute, a raised line leading from the anterior ocellus and graduating into the slightly marked interantennal ridge, front densely silvery pubescent high up the orbits as far as the anterior ocellus, clypeus more than usually elevated, surface convex; mandibles red, shining. Antennæ unusually long and filiform, not at all thickening towards the tips, long and slender jointed, almost imperceptibly dentate beneath; basal joint of flagellum as long as the middle joint of the scape; sutures very distinct, joints of scape dark red, almost black, tipped with red, flagellum paler red beneath, darker dull red above. Prothorax well crested, angular on the sides, behind the crest, thickly pubescent; meso-scutum thickly punctured, pubescent mesial and sub-mesial lines anteriorly distinct; meta-scutellum with long hirsuties, flanks thickly pubescent; propodeum with the enclosure very distinct, narrower than usual, with three distinct high and narrow ridges on each side of the very broad and distinct mesial furrow, the enclosed fossæ regularly oblong, deep and polished at bottom; posteriorly angulated, owing to the high and unusually large irregular ridges; a large ridge on each side, and within on each side of the mesial furrow which is broad, depressed, the tumid angulated sides rise up from it gradually. Tegulæ and nervures and pterostigma pale-red, legs pale testaceous reddish; fore femora blackish above, hind femora black, tibiæ pale fuscous, testaceous, hind pair darker in the middle; all the tarsi uniformly concolorous with the fore tibiæ. Abdomen, excepting the pedicel, as long as the head and thorax together; pedicel much curved, nearly as long as the abdomen is wide, its surface broad and flattened above, sides expanded,

deeply grooved laterally and mesially beneath, black, smooth and polished, rest of abdomen red, two terminal rings black, extreme tip fuscous, paler beneath, scarcely black.

Length, .30 inch.

Tuckerman's Ravine, Mt. Washington, N. H., captured August 11, by the late Mr. C. A. Shurtleff. (Museum Bost. Soc. Nat. Hist.)

The unusually long filiform pale red antennæ, the elevated convex silvery front, pale red mandibles, coarsely rugose propodeum with rough sides posteriorly, the pedicel flattened above, and pale reddish tip of the abdomen, which is almost entirely red beneath, afford characters which easily limit this interesting boreal species.

***Mimesa proxima*, Cresson.**

*M. proxima*, Cresson. Proc. Ent. Soc. Phil., iv, p. 488. (1865).

Colorado Territory, Ridings. (Coll. Ent. Soc. Phil.)

***Mimesa borealis*, Smith.**

*M. borealis*, Smith, Cat. Hym. Brit. Mus., iv, p. 431. (1856).

♂. Head of the usual proportion, vertex moderately convex, surface finely puncto-striated, scarcely polished, front silvery, mandibles reddish, tips black; antennæ moderately clavate, scape black, flagellum pale red beneath, brown at tips, almost entirely pale red. Prothorax pubescent, silvery behind the crest, which is well marked. Surface of meso-scutum finely, minutely not densely, punctured, polished, scutellum and meta-scutellum puncto-striated, dull, not polished; propodeum with the enclosure slightly marked, with four or five irregular slightly marked rugæ on each side of the mesial furrow, which is minute, indistinct, narrow; posteriorly the tumid sides are covered with an unusually coarse net-work of irregular rugæ covering the surface of the shallow slight broad mesial furrow, next the insertion of the abdomen. Tegulæ testaceous, wings very faintly clouded with sub-testaceous; pterostigma ferruginous, nervures darker; two fore pair of femora black, tipped with ferruginous, sericeous; fore and middle tibiæ uniformly reddish testaceous; hind pair black at base and tips; fore and middle tarsi uniformly concolorous with the tibiæ; hind tarsi blackish at base of joints, minutely but densely hirsute. Abdomen one-third longer than head and thorax together; pedicel shorter than usual, equalling in length the width of the abdomen, twice ridged laterally, smooth, above convex, while the body of the abdomen is much elongated; 2d ring long and narrow, black, hind edge red, 3d segment red, 4th red on the front edge, remainder black; tip elongate, narrow, minutely but densely hirsute, simple, not ridged. Length, .27 inch.

Canada, (Coll. Ent. Soc. Phil.), "Hudson's Bay," (Smith).

Easily known by its very coarse net-work of fossulets, with propodeum much more marked than in the other species, by the red tips of the antennæ, the very narrow second joint of the abdomen, the dull puncto-striated head, the pale reddish feet, red band on the abdomen, which is narrower than usual, but a single ring being entirely red.

*Mimesa pauper*, n. sp.

♂. Head of the usual proportions, ocelli arranged in a regular equilateral triangle; vertex well elevated, convex, surface minutely puncto-striated, slightly polished; a well marked raised line in front of the anterior ocellus; a slight thin hirsuties on the vertex, front slightly transversely elevated between the insertion of the antennæ; clypeus regularly elliptical in form, at base darker, as the pubescence is thinner than elsewhere; terminal two-thirds of the mandibles deep red; antennæ slender, not so clavate as usual, more filiform, scape black, beneath pale reddish, brown above; terminal joint slightly reddish above, sutures distinct, surface of thorax rather thickly, but minutely punctured, polished, meta-scutellum hirsute; propodeum with the enclosure distinct, very transverse, irregularly, but very broadly triangular, with seven or eight minute rugæ on each side of the long narrow, almost obsolete mesial furrow; posteriorly a fine net-work of irregular fossulets, and a slight shallow mesial furrow less distinctly marked than usual; hirsute, especially posteriorly. Tegulæ reddish, costal nervures ferruginous, pterostigma ferruginous; femora black, sericeous, tipped on the anterior pair with red; two anterior pair of tibiæ red, posterior red, but dark in the middle; two anterior pair of tarsi pale red; posterior pair black-brown, pale red at tip; pedicel two-thirds as long as the width of the abdomen, quadrangular with a mesial raised prominent ridge on the upper side; posterior edge of 2d ring, and entire 3d ring red; terminal rings paler on hind edges, tip smooth, plain, not so hirsute as usual.

Length, .26 inch.

Illinois, (Coll. Ent. Soc. Phil.).

With the exception of *M. uncinata*, Cress., this is the smallest species yet known to us. Its bronzen front, slightly clavate antennæ, fine and unusually numerous striæ on the propodeum, the obliteration of the mesial furrow, short pedicel and the longer mesial ridges and short abdomen, the body of which is scarcely longer than the head and thorax together, will easily separate it from its allies.

***Mimesa cingulata*, n. sp.**

♂. Of the same size as *M. pauper*, and closely resembling it. Head of the usual proportions; vertex elevated, convex, minutely punctured, polished; an unusually prominent ridge between the insertion of the antennæ; front with a golden silvery pubescence, golden when seen from above; base of clypeus dark; mandibles black, red at tip; antennæ much more clavate, thickened more at the tip than in the preceding species; and sutures more than usually distinct; flagellum darker than usual, not so broadly pale reddish beneath as usual; tip black from above. Prothorax unusually well crested, scarcely pubescent behind the crest; meso-thorax smooth, polished, with frequent minute shallow punctures; meta-scutellum rougher, somewhat hirsute. Propodeum with a distinct broad equilaterally triangular enclosure, with four indistinct small rugæ on each side of the indistinct mesial furrow, which is crossed posteriorly by irregular rugæ; behind is a coarse net-work of rugæ, sparsely hirsute, the rugæ on the enclosure and posteriorly, are much coarser than in the preceding species, (*M. pauper*); posteriorly the mesial impressed deep broad channel is well marked. Tegulæ testaceous, nervures black; pterostigma slightly fuscous; femora black, middle and fore pair tipped with dark red; tibiæ dark red, especially the posterior pair, which are pale red at base and tips; tarsi dark, reddish at tip of joint, especially the posterior pairs. Pedicel of abdomen very short, scarcely longer than one-half the width of the body of the abdomen; above with a mesial ridge; grooved deeply on the sides, black, smooth and polished, body of abdomen not so long as the head and thorax together, entirely black, except the posterior edge of the 2d and 3d rings, the under edge of the 3d being black, shorter, more broadly ovate than in any other species; tip with an indistinct supraanal area. Length, .20 inch.

Brunswick, Me., August.

This is the shortest, plumpest, and one of the smallest species known to us; the body of the abdomen is scarcely as long as the head and thorax together, the pedicel is scarcely longer than one-half of the width of the abdomen. Also, the very clavate black antennæ, the golden pubescence on the head when seen from above, the unusual prominence between the antennæ, and the coarsely rugose propodeum are all characters in which it differs greatly from *M. pauper*, its nearest ally.

***Mimesa uncinata*, Cresson.**

*M. uncinata*, Cress., Proc., Ent. Soc., Phil., vol. iv, p. 488. (1865).  
Colorado Territory, Ridings, (Coll. Ent. Soc. Phil.).

## Family NYSSONIDÆ, Leach.

In this group, the head, compared with that of the preceding family, is much more cylindrical in outline; the vertex is higher, more convex, and inclined, especially in *Larra*, to be compressed antero-posteriorly. The front is narrow, eyes long and narrow, and the antennæ more clavate than in the Crabronidæ generally. The clypeus is long and narrow, compared with the Crabronidæ, approaching in *Stizus* somewhat the form of that of *Bembex*. Labrum large, lunate, exserted; mandibles large and stout, incurved, often subspatulate in form. The thorax is oblong square, as the propodeum is square, and generally quadrangular posteriorly, or armed with acute spines; enclosure polished and smooth or striated. The wings are long and narrow; the outer edge of the 2d sub-median cell being straight, while the cell itself is broad triangular, outer cells large and long—present in the typical genera. The abdomen is sessile in the typical genera, and near the basal ring is short and broad where its form is elongated conical, and clavate in the pedicellated genera.

The genera all differ from those of the Crabronidæ in the shorter, more transverse head, much narrower front, the long narrow clypeus and exserted visible labrum; in the elongated thorax; the long slender legs, and long narrow wings, with the large broad sub-triangular 2d sub-median cell.

This is a difficult group to limit, but we offer the present classification for the consideration of entomologists, believing it to be an approximation to a true one. It evidently connects with the Bembecidæ, as we have a *Bembex* from Cuba, remarkably resembling some European species of *Larra*; and with the genus *Stizus*. The tendency of the labrum to become elongated in *Larra*, culminates in *Bembex* and *Monedula*.

This family is easily subdivided into three subordinate groups, which we would for the present consider as subfamilies, and which rank in value with the Crabronidæ or Pemphredoninæ in the preceding family.

Of the Trypoxyloninæ, the genus *Trypoxylon* is the only representative we have in the North American fauna. Though its wings are like those of the Crabronidæ, in its other characters it departs too widely from that group to be retained in it, as many authors have done, and is on many accounts still difficult to locate in the present group. For this reason it is one of the most interesting genera among the Fossorial families, and any light thrown on its developmental his-



tory will be eagerly sought for in endeavoring to establish its true position in nature.

Its unusually deeply indented eyes and the narrowness of the head in front of the antennæ, and its remarkably long pedicellate abdomen, wherein it is mimicked by the ♂ of *Pelecinius*, are the most important subfamily characters.

#### Subfamily TRYPOXYLONINÆ.\*

##### TRYPOXYLON, Latr.

*Trypoxylites* St. Fargeau, Nat. Hist. Ins. Hym. Suite a Buffon. (1845).

*Trypoxylon*, Latr. Proa. Cav. Ins. (1796).

*Apius* Jurine, Hym. 140. (1807). •

♀. Head half as long as broad, a little convex in front, where it is much narrower than usual, about half as broad as long. The eyes are large, approaching each other on the vertex much nearer than usual, triangularly indented nearer the middle than usual. The ocelli are arranged in an equilateral triangle. The epicranium is produced acutely between the antennæ, which are nearer together than usual. The clypeus is equilateral, being distinctly so, and the two upper sides are straight, being acutely pointed above, while the base is convex, and the surface is raised in the middle. Antennæ of the usual length, hardly thickened in the middle; there is a greater equality in the three basal joints than usual, the 1st and 3d being very large, while the 2d is but a third longer than the 3d, which is flattened spherical. The thorax is cylindrical oval, narrowing more at each extremity than usual. The prothorax is more separate than usual from the succeeding ring, posteriorly, being short convex above and on the sides, and narrower than the meso-thorax; meso-scutum square, not as long as broad; scutellum oblong, twice as broad as long; meta-scutellum short, a third as long as preceding piece. The enclosure of the propodeum is more triangular than usual, very small, equilaterally triangular, and from it the sides rounds rapidly down behind and laterally. The coxæ are flattened conical, those of meso- and meta-thorax very unequal in size. The trochanters are long, legs not very stout, smooth; femora swelled, tibiæ very broad towards the tip, spurs large. Fore tarsal joints rather broad; hind tarsal joints long cylindrical, smooth, not dilated.

Primaries: the 2d and 3d sub-costal, and 2d median spaces are obsolete; pterostigma small, outer costal triangular, lanceolate acute

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\* The subfamily ending inæ is substituted for St. Fargeau's family ending, as he considered the group to be equivalent to the Crabronidæ.

without. The 1st sub-costal are large and oblong. 1st sub-median is regularly rhomboidal. 2d sub-median rather narrow, the outer side oblique and curved outward. In the secondaries the recurrent is situated farther in towards the middle of the ring than usual.

Abdomen very long, clavate, nearly a third longer than the rest of the body, thickest towards the end; 1st ring pyriform, swelled more than the other rings.

*Synopsis of the Species.*

**A. Abdomen entirely black.**

Wings purplish; no enclosure on the propodeum.....**T. politum**, Say.

Wings clear; propodeum with a distinctly, minutely lineated enclosure.....**T. clavatum**, Say.

Body black throughout; propodeum smooth, with minute and sparse punctures.....**T. excavatum**, Smith.

Smaller than usual, propodeum rugose, striated, legs black.....**T. frigidum**, Smith.

**B. Abdomen ringed with red.**

Prothorax, propodeum and legs red; 2 basal rings red...**T. collinum**, Smith.

A narrow band of red on 2d abdominal ring; clypeus excavated.....**T. rubrocinctus**, Pack.

1½ abdominal rings red; clypeus tridentate.....**T. tridentatum**, Pack.

***Trypoxylon politum*, Say.**

*T. politus*, Say, Bost. Jour. Nat. Hist. I, No. 4. p. 373. (1837).

not *T. albitarse*, Fabr.

*T. albitarse*, Beauv., Ins. Afrique et en Amérique, Pl. iii, Hym. fig. 1. p. 115. (1805).

Head of the usual proportions, front black, very finely punctured; with a coarse, sparse pubescence; clypeus raised, ridged mesially; edge thickened; polished black, with few hairs; thorax black, smooth and highly polished, very free from silvery pubescence, especially the prothorax; propodeum smooth and polished; enclosure obsolete, scarcely marked, with a rather thick and short pubescence evenly distributed over the entire surface. Tegulae black; wings smooth, dark, with a deep violaceous tinge. Legs black throughout, hind tarsi of a pale testaceous. Abdomen as usual, though more stoutly clavate, with an acute tip slightly ridged above.

Length .70—.85 inch.

New Jersey, Pennsylvania and Illinois, (Coll. Ent. Soc. Phil.). (Coll. Mr. Norton).

The largest species known, easily identified by the dark violaceous wings, black face and thorax, and the obsolete enclosure of the propodeum, while the abdomen is considerably stouter than usual.

***Trypoxylon clavatum*, Say.**

*T. fuscipennis*, Beauv., Ins. Afrique et en Amér. Hym. pl. iii, fig. 2, p. 115. (1805).

not *T. fuscipennis*, Fabr., Sp. Syst. Piez. 181, 3. (1805).

*T. clavatus*, Harris, Cat. Ins. Mass. p. 68. (1835).

Say, Bost. Jour. Nat. Hist. vol. i, p. 374. (1837).

*T. clavatum*, Smith, Cat. Hym. Br. Mus. iv, p. 381. (1856).

♀. Head as usual, front very thickly silvery pubescent; antennæ little more clavate towards the tip than in the preceding species, black; mandibles black; thorax densely pubescent; propodeum with a large, distinct, triangular area; mesial furrow very distinct, with slight linear rugæ, posteriorly at the apex of the enclosure an area covered with transverse parallel curvilinear lines; very densely silvery pubescent on the sides of the propodeum; wings differ from those of *T. politum* in being clear, slightly clouded externally; pterostigma much more distinct; outer side of 1st sub-costal cell bent in the middle, where in *T. politum* it is slightly curved, while the outer side of the 2d sub-median cell is more obliquely and slightly curved than in *T. politum*, where it is suddenly bent. Fore legs black, tarsi slightly paler; middle legs black, tarsi with tips of joints 1—4 fuscous, unguinal joint black; hind legs black, tarsi pale testaceous, unguinal joint entirely black, while in *T. politum* it is white, and only the ungues themselves are black. Abdomen as in the preceding species, but a little slenderer.

Length of body, .54 inch.

In this species there is a good deal of variation in the amount of striation of the enclosure of the propodeum, some specimens having it smooth, polished, and minutely punctured, and at the apex transversely minutely striated; while in others the base of the enclosure is longitudinally striated, and with the cross-line very much larger than in others, much as described in *T. tridentatum*.

Illinois, (Coll. Ent. Soc. Phil.). North Carolina, (Hentz, Harris, Coll. B. S. N. H.) West Farms, N. Y., (Angus).

***Trypoxylon excavatum*, Smith.**

*T. excavatum*, Smith, Cat. Hym. B. M. iv. p. 380. (1856.)

This species is a little smaller than *T. clavatum*; the front is narrower, not so silvery pubescent; the outer edge of the wing and the costa beyond the pterostigma is more clouded; tarsi uniformly black; joints very narrowly tipped with testaceous, sericeous; propodeum with a semielliptical area, with slightly raised sides, and a dense oblique line of silvery pubescence on each side.

Cuba, (Coll. Ent. Soc. Phil.).

***Trypoxylon frigidum*, Smith.**

*T. frigidum*, Smith, Cat. Hym. Br. Mus. iv. p. 380. (1856).

♂. Head black, very minutely punctured, not pubescent, except on the clypeal region; clypeus with a dull mesial tooth; mandibles reddish externally; antennæ not emarginate; thorax very smooth and shining, only pubescent on the flanks; propodeum unusually free from pubescence, with a few slight irregular unequal striæ at base, slightly diverging from the mesial line, posteriorly very slightly rugose with fine lines; mesial line raised, distinct, posteriorly a long ovate pit, on the flanks a slight longitudinal ridge; tegulæ and nervures black. Legs black throughout, tarsi concolorous, hind tibial spurs testaceous, not sericeous.

Abdomen thick, clavate, not much longer than the head and thorax together, black, smooth and shining.

Length, .26 inch.

♀. Differs in its broader, more transverse head, more clavate antennæ, longer acute abdomen, and the rugæ on the propodeum are much more distinct, there being a broad subtriangular enclosure, with about five unequal rugæ on each side of the mesial ridge, which is distinctly demarked from the minutely lineated posterior surface of the propodeum.

Length, .32—.44 inch.

Illinois, New York, (Coll. Ent. Soc. Phil.). West Farms, N. Y., (Angus). Connecticut, (Norton). "Cambridge, June 1—15, July 15, on flowers." Harris. Maine, (Harris). Dublin, N. H., Leonard, (Harris Coll.). Brunswick, Me., July and August, (Packard).

Easily recognized by its small size, the black head, with its silvery pubescence which is confined to the orbits and clypeal region, as the body generally is remarkably free from pubescence. The smooth thorax and distinct propodeal area is rugose, and posteriorly lineated, in which it differs from all the other species, as much as by the want of the pubescence. The abdomen is unusually thick at the base, being regularly clavate.

It lives in the stems of *Syringa*, from which it has been reared by Mr. Angus.

***Trypoxylon collinum*, Smith.**

*T. collinum*, Smith, Cat. Hym. Br. Mus. iv. p. 381. (1856).

♂. Front narrow, coarsely punctured, indentation of the eyes narrow and deep; a black, prominent, undivided tubercle below the ocelli; clypeal region thickly silvery pubescent; edge of clypeus bidentate; surface not much raised, no mesial carina; mandibles pale red, palpi a

little paler than the mandibles. Antennæ short, scarcely clavate, basal two-thirds red, outer third brown. Prothorax entirely red, smooth, polished, with a blunt transverse carina, rounded on the sides. Thorax sparsely and slightly punctured, black, polished, a little silvery pubescent on the flanks and on the propodeum, which is red, black below, at base with longitudinal slightly diverging, rather irregular ridges, much coarser than usual, which posteriorly on the horizontal enclosure become transverse and curvilinear, much as described in the succeeding species, but larger; the ridges above are fine and numerous, but becoming fewer and much larger on the flanks, which are covered with a coarse net-work of fossulets. Tegulæ and insertion of wings reddish; wings dark and iridescent near the outer edge, nervures reddish; anterior legs, including the coxæ, entirely red, middle and hind trochanters red at tip, middle and hind legs red, except the hind femora which are black, though all the trochanters are red. Abdomen long and slender, two basal joints slender, red, suddenly thickened towards the tip, becoming rounded, clavate, tip very acuminate.

Length, .40 inch.

♀. Head more transverse, front broader; below, and including the indentations of the eyes, the pubescence is of a rich golden hue; only the upper part of propodeum corresponding to the enclosure is red, the sculpturing is the same; legs entirely red, hind femora concolorous with the rest; tip of abdomen with an unusually sharp mucro.

Length, .45 inch.

Florida, (Norton).

***Trypoxylon rubro-cinctum*, n. sp.**

♀. Head with the front narrower than usual, as the ocelli nearly touch the eyes; much more coarsely punctured than the succeeding species, becoming hairy towards the bicarinate prominence which is acute but truncate at extreme tip; clypeal region silvery pubescent; surface of the clypeus broad, not ridged mesially, front edge slightly thickened towards the tip, mesially with a semicircular excavation, thus giving a bilobate appearance to the edge; mandibles red, smooth, edges distinctly emarginate; palpi short and thickly jointed, minute, narrowly testaceous at tip; antennæ black, slenderer than in *T. tridentatum*; sutures well defined. Prothorax well crested, hirsute posteriorly; thorax above minutely and sparsely punctured, smooth and polished; meta-scutellum with a long, dense, silvery hirsuties, especially on the sides. Propodeum with no distinct enclosure, but at base anteriorly with very minute, transverse, almost imperceptible lines, more distinct

posteriorly; with a slight mesial ovate depression, hirsute on the sides; tegulae reddish testaceous, wings slightly clouded on the outer edge, distinctly iridescent. Legs black, slightly sericeous, basal joints of the tarsus pale fuscous at base, especially at the posterior pair, tips brown-black. Abdomen long and slender; on the 3d and succeeding joints rather suddenly clavate, more so than in the other species; two basal joints very slender and long, above mesially grooved, entirely black, basal half of 2d ring red; tip acute, raised mesially, one-third longer than head and thorax.

Length, .40—.48; head and thorax, .20; abdomen, .28 inch.

Delaware, (Ent. Soc. Phil.). Virginia, (Norton).

Its narrow front, which is more sparsely punctured than usual, its excavated, slightly bilobate clypeus, the much more finely striated propodeum, and the more suddenly clavate abdomen, with the narrow red ring on the basal half of the 2d ring, and its smaller size, will sufficiently distinguish this species from *T. tridentatum*.

***Trypoxylon tridentatum*, n. sp.**

♀. Head closely resembling that of *T. rubro-cinctum*, front wider and more finely punctured, and the pubescence and interantennal bicarinate protuberance the same; clypeus tridentate on anterior edge, towards which the surface is raised, and there is a slight mesial carina which is deeply excavated, thus giving a bilobate form to the edge, while the end of the mesial carina, projecting out sharply, gives a bidentate appearance when seen from above. Thorax as in the preceding species, finely pubescent, thicker on the sides. Propodeum with a shallow semi-elliptical depression, large and swelling sides, with very regular, parallel, curvilinear striæ, curving from the base, and arcuated on the swollen sides; the striæ become coarse on the flanks, and are doubled obliquely forwards; posteriorly, the mesial line is much smaller than in preceding species, being linear. Wings dusky on the outer border, nervules black, not so iridescent as in *T. rubro-cinctum*. Legs black, hind tarsi black-brown, sericeous, with the tips of the joints narrowly dark testaceous. Abdomen much thicker at the base, more regularly clavate than in the preceding species; terminal third of the basal, and the entire 2d joint bright red, remainder black; tip as in the preceding species.

Length, .44; head and thorax, .20; abdomen, .24 inch.

New York, New Jersey, (Norton).

Its more filiform antennæ, tridentate clypeus, broader front, and peculiar striation of the propodeum, the black tarsi and broad band of

bright red encircling the second and part of the preceding rings, will readily separate this species from its allies.

DESIDERATA.

*Trypoxylon carinatum*, Say, Bost. Jour. N. H. i. p. 374. (1837).

"Indiana," (Say).

*T. subimpressum*, Smith, Cat. Hym. Br. Mus. iv. p. 380. (1856).

St Domingo, (Smith).

*T. succinctum*, Cress., Proc. iv. p. 149. (1865).

Cuba.

Subfamily MELLININÆ.

*Mellinidæ*, Dahlb., Hym. Eur. i. p. 226. (1843—45).

*Mellinites*, St. Farg., H. N. Ins. Hym. iii. p. 85. (1845).

This subfamily, as we would consider it, is known by the cubical head, very broad front, and slender antennæ. The abdomen in the typical genus is pedunculate, in *Alyson*, sessile. The enclosure of the propodeum is very large, square and rugose, or scutellate and highly polished.

MELLINUS, Fabr.

*Mellinus*, in part, Fabr., Ent. Syst. ii. 285. (1793).

Head half as long as broad, the sides narrowing behind. Ocelli placed moderately far apart, in a triangle a little below the vertex. Eyes rather long and narrow, within somewhat concave, approximating on the vertex. Front broad, square, somewhat convex in front, as long as broad; it is flat, narrowing towards the front in ♂, while in ♀ the sides are parallel. The base of the clypeus and foramina are in a straight line, reaching from the lower angles of the eyes. The epicranium is hardly raised between the bases of the antennæ. The middle region of the clypeus scarcely passes beyond this line, and is half as long as broad. Mandibles in ♀ bevelled on the outer third, 3-toothed, the middle much the longer, the lateral ones indistinct, antennæ rather long, hardly thickened in the middle, 2d joint thick, half as long as broad, somewhat flattened, 3d globose, remaining joints of very uniform length. Thorax oval, narrowing more rapidly than usual behind the middle. Pro-scutellum rather narrow, thickened and rounded above; meso-scutum hardly as long as broad, square. Both the scutellum and meta-scutellum longer than usual. Enclosure of the propodeum forming a large shield-like piece, with a distinct suture, either smooth or with an oval ridge upon its surface; from its hind margin it is suddenly bent down; middle flanks much enlarged, full, convex and horizontal; third flank more inclined, apparently laying on the top of the middle ones, and produced beyond. Middle trochanters as long

as the coxæ, being slender. Hind coxæ nearly twice as long as broad, the costal sub-triangular; femora slender, swelled, often cultrate in shape, fore tarsi long and slender; those of the ♀ broader, and the middle joints sub-triangular; hind tibiæ trigonate, nearly smooth, spurs long and curved; hind tarsi long and slender, lobes only spined; much shorter and stouter in ♀ than in ♂.

Primaries with the 2d costal vein long, triangular; the upper side of the 1st sub-costal space is regularly curved, not so angulated as usual; 2d space pentagonal, the inner side bent in the middle, and sending a short vein back into the 1st space; the 3d is nearly square, oblique. The 1st median space is produced rhomboidal, the outer angle being rounded; 2d space 5-sided, very irregular, the inner half being half as broad as the outer side; 2d internal one-third as broad as long. The secondaries have the median nervure much bent inwards after leaving its branch in the middle of the wing. The interno-median recurrent is very oblique, joining the median beyond the origin of the median nervure, so that it is much nearer the margin than in any other genus of the group. The wing is broad and rather deeply lobed at the base. Abdomen long, a little longer than head and thorax, ovate or sub-clavate, flattened, pedunculated, the outer half of the 1st joint widens towards the end, much as in *Eumenes*. In the ♀ the abdomen is shorter, more ovate than in ♂.

The genus is easily known by its flat front, indented eyes, very short clypeus, slender antennæ; by the abdomen tapering behind more rapidly than usual, the horizontal middle flank being overlaid by the hind flanks; also by the very distinct large enclosure of the propodeum, with its plain suture; this piece, which is seen less distinctly in *Oxybelus*, is here very apparent; the pedunculated abdomen varies sexually and specifically in its length and proportions. Indeed there is a good deal of variation in the species as regards the front of the head, which narrows behind more in the ♀ than ♂. The tip of the abdomen is plain, not ridged, and the styles do not appear in the ♂. The females appear to possess no sting.

***Mellinus bimaculatus*, Say, MS.**

*M. bimaculatus*, Harr., Cat. Ins., Mass., p. 68. (1835).

♀. Head dull black, densely but minutely punctured, orbits striped with yellow on each side; mandibles smooth, piceous, upper edge narrowly yellowish; antennæ dark, terminal half testaceous on the sides; the three terminal joints broadly annulated with testaceous. Prothorax yellow above, thorax black, very minutely punctured, somewhat



polished, a yellow dot on the scutellum and meta-scutellum; propodeum with the enclosure polished; flanks pubescent below the lateral ridge; two anterior pair of femora slightly tipped with yellow; tibiae yellow, with a broad brown stripe above. Fore tarsi yellow, middle and hind tarsi darker. Abdomen entirely black, with two remote ovate yellow spots on the 3d segment, tip broad, equilaterally triangular, extreme tip truncate, sides ridged.

Length, .32 inch.

Dublin, N. H., Leonard, (Harr. Coll.), Brunswick, Me. Rather rare.

Easily known by its black head, pale tipped antennæ, and the two ovate yellow spots on the abdomen. It is smaller and dull colored, compared with the succeeding species.

**Mellinus rufinodus**, Cresson.

*M. rufinodus*, Cress., Proc. iv., p. 475. (1865).

Colorado Territory, (Ridings, Coll. Ent. Soc., Phil.).

#### ALYSON, Jurine.

*Alyson*, Jurine, Hym., p. 196. (1807).

♂. Head transverse, short and broad, sides not retreating posteriorly so rapidly as in *Mellinus*; eyes not at all excavated, orbits being straight; ocelli placed more on the vertex, being more posterior than *Mellinus*; front rather flat, sides converging slightly, mesial line well impressed; clypeus large, short, very broad, with long sparse setose hairs, surface moderately convex; labrum slightly exerted, small, narrow, oblong; joints of the palpi long and slender, cylindrical; antennæ subfiliform, very slightly thickening in the middle, terminal joint long, pinched in in the middle. Prothorax elongated, unusually narrow, meso-scutum very short, scutellum narrow and long, nearly square; meta-scutellum a little longer than in *Mellinus*; tubercle very prominent, and middle flanks, especially, very prominent and convex. Propodeum greatly elongated; enclosure narrow and very long, a third longer than broad at base, with three series of transverse rugæ separated by two longitudinal ridges bounding the mesial furrow, the propodeum above spreading out far on each side to the lateral ridge, posteriorly rounded, but not narrowing; fossulets much enlarged towards the insertion of the abdomen, wings with the pterostigma much enlarged; the 3d costal cell very triangular, short; 2d sub-costal cell minute, appendiculate anteriorly, 3d sub-costal cell very short, narrowing anteriorly; all the cells broader and shorter than in *Mellinus*, as the wing is much shorter and the outer edge straighter. Legs very long and slender, tarsi

unusually long and small, hirsute. Abdomen equalling in length the head and thorax, long and narrow, oval lanceolate, tip with three setæ.

♀. Antennæ long filiform, joints a little thickened at the sutures, abdomen with a broad sub-triangular supraanal area at tip. The species are highly colored, red and yellow on the thorax and abdomen.

This genus will be easily known by its very elongated propodeum and thorax generally, reminding us of *Passalæcus*, and also strongly mimicking the Pompilidæ, as the elongated form is a sign of degradation. The unusually long and narrow propodeum suddenly truncated, with the edges rounded off, the broad wings with unusually broad and short cells, the minute appendiculated 2d sub-costal, and the gay coloration of the species, together with the great disparity of the sexes, renders the genus a very interesting one.

Shuckard remarks that the front edge of the clypeus is bi- or tridentate. That of our species is smooth, not indented, and the labrum is very distinct, crescentic in shape, but narrow and short compared with some other genera of the family.

**Alyson oppositus, Say.**

*A. oppositus*, Say, Bost. Jour. Nat. Hist., i, p. 380. (1837).

Smith, Cat. Hym. Br. Mus., iv, p. 373. (1856).

♂. Body deep shining jet black; head smooth, shining, imperceptibly punctured, with a fine pubescence; orbits yellow towards the clypeus, which is black, thinly pubescent; mandibles yellow; palpi yellow testaceous, joints long and slender, brown at base; antennæ brownish black throughout. Thorax black throughout, very slightly punctured and pubescent. Propodeum with five rows of fossæ, of which the mesial is the largest, and is dilated at the apex of the enclosure, from which on the flanks diverge coarse parallel, quite regular striæ, becoming smaller on the flanks, and towards the insertion of the abdomen very irregular and numerous. Wings clear transparent, immaculate; nervures dark brown; fore trochanters pale at tip, femora black, sericeous, fore and middle pairs tipped slightly with yellow; fore and middle tibiæ yellow, brownish above; hind tibiæ brown, hirsute, spurs testaceous; tarsi pale brown, sericeous. Abdomen wholly black, polished and shining, with two remote round yellow spots on the second ring, tip slightly hirsute, with three setæ.

Length, .22—.30 inch.

♀. Front broader than in ♂, clypeus yellow, flagellum fuscous beneath at base. The basal joint of the abdomen is red in my speci-

mens, though Say describes them as yellow, the discrepancy is probably due to a difference of age; the spots on the abdomen as in the ♂. Wings with a broad dusky irregular band on the outer fourth of the wing. Legs reddish yellow, in some specimens nearly black, tarsi pale.

Length, .30 inch.

New Jersey, (Coll. Ent. Soc., Phil.), The Glen, White Mountains. on Solidago, in August. Northern Maine, Grand Lake, Head waters of the Penobscot, August.

This species represents *A. bimaculatus* Panzer, of Europe. Its black body, black clypeus and two yellow spots on the abdomen, which has the basal ring yellowish red in the ♀, will enable the species to be readily distinguished from the succeeding.

**Alyson melleus**, Say.

*A. melleus*, Say, Bost. Jour. Nat. Hist., i, p. 380. (1837.)

Smith, Cat. Hym. Br. Mus., iv, p. 373. (1856).

♀. Head brown-black, densely not finely punctured, clypeus reddish yellow, with long sparse hairs; mandibles light honey yellow, scape of antennæ yellow beneath, thorax entirely red, meso-thorax black beneath; wings distinctly banded beyond the pterostigma, the band reaching nearly across the wing; basal ring and one-half of 2d abdominal ring reddish, the remainder black, with two remote yellow round spots on the anterior half of the 2d ring. Legs red, fore and hind tibiæ brown, hind femora pale brown. Propodeum more finely sculptured than in *A. oppositus*.

Length, .26 inch.

New Jersey, (Coll. Ent. Soc. Phil.).

A much slenderer and somewhat smaller species than the preceding.

#### DESIDERATUM.

**Alyson aculeatum**, Cress., Proc. iv, p. 148. (1865).

Cuba, (Gundlach.)

#### Subfamily NYSSONINÆ, Packard.

The more essential characters of this group are the narrow front of the head, with the long narrow clypeus. The abdomen becomes in the lower genera sessile, the basal ring of the abdomen being broad and square, while in *Gorytes* it is more usually subpedunculated in the typical species.

**GORYTES**, Latr.

"*Gorytes*, Latr., Hist. Nat., xiii, 308. (1805)."

This extensive and well known genus may be easily recognized by its transversely ovate cylindrical shaped head, when seen from above, though the angles are quite well marked, while the front is unusually narrow, as the large full eyes approach unusually near each other; on this account the clypeus is much longer than usual; the antennæ are clavate. The propodeum is round, very smooth and unarmed; the triangular enclosure is either smooth and highly polished, or very regularly striated. The other sub-costal cells are large, and the 2d is very broad, where it is minute and subpedunculated in *Nysson*. The legs are short, and the sessile, or more generally, subpedunculate abdomen is distinctly ovate. It is a true mimetic, or comprehensive type, reminding us strikingly of *Odynerus*, a member of the Vespidae, a higher group. In its neuration it does not differ greatly from *Mellinus*, but the front of the head is very different.

*Synopsis of the Species.*

A. Front twice as broad as in the following species; edge of clypeus greatly thickened; body coarsely punctured.

Body very short; wings spotted; clypeus black.....*G. nebulosus*, Pack.

B. *Odynerus*-like, body long and slender, smooth and polished, rounded trapezoidal, yellow.

Antennæ red on the basal two-thirds; two large oval spots on the propodeum.....*G. venustus*, Cress.

Antennæ black, two basal abdominal rings yellow, propodeum with red spots.....*G. abdominalis*, Cress.

Antennæ red beneath, brown above, 2d abdominal ring red, yellow band behind.....*G. rufo-luteus*, Pack.

Antennæ pale fuscous beneath, yellow above; body black, propodeum smooth, abdomen black, with yellow bands.....*G. fulvipennis*, Smith.

Antennæ red, brown on tips above, two basal rings of abdomen red with yellow bands, propodeum smooth.....*G. modestus*, Cress.

Body black, antennæ black, wings clear, 3d costal cell clouded.....*G. ephippiatus*, Pack.

Antennæ black, body dull black, legs black, propodeum coarsely punctured, with two yellow dots...*G. rugosus*, Pack.

Propodeum with six striæ on each side of the mesial furrow; black; antennæ black, red beneath towards base.....*G. simillimus*, Smith.

Propodeum with three striæ on each side of the mesial furrow, posteriorly very coarsely fossulated.....*G. canaliculatus*, Pack.

Body brown, polished, with narrow yellow rings; propodeum smooth and polished; basal abdominal ring black; antennæ yellow, red beneath.....*G. flavicornis*, (Harr.)

Black, antennæ fuscous blackish, enclosure of propodeum 14-striated, with no yellow spots.....*G. atricornis*, (Harr.)

*C. ♂*. Body very short, wings clouded anteriorly, antennæ denticulated.

Propodeum and whole body coarsely punctured, enclosure with four short very regular straight ridges on each side of the mesial furrow.....*G. denticulatus*, Pack.

*D.* Monedula-like, front much narrower than usual.

Wings not clouded; propodeum punctured, not striated.*G. moneduloides*, Pack.

*Gorytes mystacea* of Europe, falls into another group, which we would locate between groups *B.* and *C.* It is characterized by its broad front, its unusually small, narrow head, clear wings, very narrow 3d sub-costal cell, and short body.

#### *Section A.*

In the first group of the genus, the females have the head unusually short and the vertex flat, Mellinus-like; antennæ small and filiform throughout; clypeus very broad and short, edge revolute, much thickened; body very short; thorax stout; propodeum unusually short, legs short; 3d sub-costal cell very short, nearly square; abdomen very short, especially the basal ring.

*Gorytes nebulosus*, Pack.

*♀*. Head very broad, oblong when seen from above, vertex raised, coarsely punctured, front nearly twice as broad as in the succeeding species, sides parallel, straight, orbits yellow; clypeus black, smooth, like the lower (or anterior) part of the front; edge greatly thickened, overhung by hairs; labrum distinct, broad and short; palpi black; mandibles black; antennæ very slender filiform and short, shape very slender, yellow beneath, prothorax broad, yellow above. Body throughout coarsely punctured, a yellow spot behind the black tubercle; a yellow line on the scutellum; propodeum with a small triangular enclosure, with very regular large striæ, 7 on each side of the two mesial ones, the mesial furrow scarcely differing from the other interspaces; posteriorly is a coarse net-work of large punctures, which are scarcely striated. Tegulæ dark testaceous; wings with the outer edge very short, 3d sub-costal cell short, as broad as long, nebulous, the 3d costal, 2d sub-costal and 2d sub-median clouded; nervules black throughout. Legs dark, femora black, tipped with reddish yellow; tibiæ fuscous yellow, darker externally near the tip, tarsi fuscous, hind

pair brown. Abdomen short conical, with sutures deeply impressed, coarsely punctured, with broad yellow bands; on the second ring spreading on sides of posterior edge; on 5th ring a short mesial ridge; tip slightly ridged, coarsely punctured.

Length, .38 inch.

Massachusetts, (Sanborn). New Jersey, (Coll. Ent. Soc. Phil.).

Easily recognized by the spotted wings, not being continuously clouded as usual, its very broad front, unusually wide, black, clypeus with its edge greatly thickened, its filiform antennæ and short abdomen, with its tip coarsely punctured, and by its coarsely, but very regularly grooved enclosure.

*Gorytes venustus*, Cresson.

*G. venustus*, Cress., Proc. iv, p. 472. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

*Gorytes abdominalis*, Cress.

*G. abdominalis*, Cress., Proc. iv, p. 474. (1865).

Col. Terr., (Coll. Ent. Soc. Phil.).

*Gorytes rufoluteus*, Pack.

♂ and ♀. Body rufous, polished; head dark brown, with a few very minute punctures, with a short fine rather dense pubescence; orbits and clypeal region yellow, with a long silvery hirsuties, which is wanting on the front part of the clypeus, the front edge of which is emarginate, reddish, labrum yellow, convex, edge setose; mandibles black on the outer half, inner tooth remote, small; palpi slender, cylindrical, pale testaceous, antennæ with the scape yellowish beneath; pale reddish, brownish above towards the tip. Thorax black-brown, prothorax yellow above; a large squarish spot behind the tubercle, and a smaller additional one beneath scutum, reddish, with a yellow stripe next the tegulæ which are reddish; a yellow tubercle just beneath the insertion of the wing; posterior half of scutellum yellow; meta-scutellum and enclosure of the propodeum black-brown, enclosure smooth and polished throughout, with a fine hirsuties; on the outside is a large oval lanceolate yellow spot, bordered within and without with red, which expands within, meeting on the mesial furrow which here forms a rather deep short fossa; flanks black-brown. Wings much clouded, with a purplish tinge, not extending to the outer border; nervures dark, but costal nervures and pterostigma very pale testaceous; fore coxæ yellowish above, trochanters almost entirely yellowish; middle pair blackish brown above, yellowish beneath; hind pair reddish, blackish above on the basal two-thirds; tibiæ and tarsi throughout yellowish; hind tibiæ a little fuscous above; unguis black. Abdomen polished, red-

dish, with yellow and black stripes, basal joint almost entirely yellow, black beneath, reddish above in the middle, but yellowish on the sides; edge of 2d ring broadly ringed with yellow; behind, a broad black ring on the front edge of the 3d ring, the same on the succeeding rings; tip broad and large, channeled slightly, yellowish red.

Length, .40—.50 inch.

Illinois, Louisiana, (Coll. Ent. Soc. Phil.).

Its gay colors, being banded with yellow and black, the latter of which appear more distinctly when the body is stretched out, the yellow anterior coxæ and femora, the smooth enclosure of the propodeum with the large yellow spots bordered on each side, but within most broadly with red, the pale antennæ and gaily colored thorax will enable it to be readily distinguished. Both sexes are much alike. A ♂ from Illinois has the abdomen behind the 2d ring black, with yellow stripes.

***Gorytes fulvipennis*, Smith.**

*G. fulvipennis*, Smith, Cat. Hym. Br. Mus. iv. p. 367. (1856).

Canada, (Coll. Ent. Soc. Phil.).

***Gorytes modestus*, Cress.**

*G. modestus*, Cress., Proc. iv, p. 473. (1865).

Colorado Territory, (Coll. Ent. Soc. Phil.).

***Gorytes ephippiatus*, n. sp.**

♂. Head and the whole body deep black, smooth and highly polished; orbits towards the clypeus, supra-clypeal piece and clypeus honey yellow, the front edge of latter narrowly edged with black; labrum exserted, short and broad, covered with long setæ; mandibles black; antennæ yellow, with a black stripe above, flagellum black, thorax brown, with a yellow stripe on the prothorax, and on the scutellum; a large yellow sub-triangular spot behind the small ocellated tubercle; enclosure smooth, striated posteriorly at base, though most thickly so on the flanks; a narrow, oval, lanceolate mesial furrow, on each side of which are large ridges, becoming obsolete posteriorly; on the outer side are minute short ridges which give a pitted, beaded appearance to the surface; a large ovate elliptical yellow spot on each side of the propodeum. Tegulæ testaceous anteriorly, dark rufous posteriorly; nervures testaceous, darker on the costal edge; 3d costal cell dark-brown, contrasting unusually with the scarcely clouded outer edge of the wing. Femora black, broadly tipped with yellow, extending inwards beneath, the yellow patch is broadest on the middle pair; two fore femora yellow with a black ovate spot behind; hind tibiæ

fuscous yellow, dark towards tip above; two anterior pair of tarsi pale yellow; hind pair dark brown throughout. Abdomen broad and stout, black, polished like the thorax, a broad yellow band on each ring, on the basal ring the band is slightly excavated in front; 2d band broad; terminal three narrower bands very distinct from the black abdomen; tip dark, with a light pubescence; banded beneath.

Length, .38 inch.

Illinois, (Coll. Ent. Soc. Phil.).

Easily known by its black unusually polished and smooth body, its yellow orbits which are broader than usual, the clypeus almost imperceptibly excavated on the front edge, the absence of any yellow spots on the propodeum and the singularly sculptured enclosure.

*Gorytes rugosus*, n. sp.

♂. Body uniformly deep black; head with the front broader between the eyes than usual, surface unusually coarsely punctured, not much polished, dull colored; orbits yellow, but the supra-clypeal region is black; clypeus broader than usual, yellow, mandibles black; labial palpi brown; three terminal joints of maxillary palpi yellowish; antennæ long filiform, scape yellow beneath, the remainder black, sutures of joints of flagellum deeply impressed, surface of joints roughened. Thorax black, a yellow stripe on the prothorax and on the scutellum; tubercle black, but behind it an oblong yellow spot, propodeum with a very distinct enclosure, with five equidistant distinct straight ridges on each side of the narrow mesial furrow; these ridges are larger and more distinct than in *G. phaleratus*, but become obsolete towards the end of the enclosure; posteriorly are very coarse unequal, mostly parallel rugæ, with a sparse grey pubescence, and two yellow dots on the middle of the wing, where in *G. phaleratus* it is smooth and polished, wings unusually clear, 3d costal cell darker; nervules blackish throughout; legs deep black and yellow; fore and middle femora black, tipped with yellow, and with a yellow line beneath; hind femora entirely black; tibiæ black, yellow beneath; anterior and middle tarsi honey-yellow, hind tarsi brown-black. Abdomen black, polished, with broad yellow rings, of which the basal is broadest, with a deep mesial sinus in front; 2d very broad, remainder linear; beneath all the bands are obsolete except on the 2d ring; tip black.

Length, .40 inch.

Brunswick, Me., not infrequent in August on flowers.

Differs from *G. phaleratus* in the dull black coarsely punctured body, with a sparse grey pubescence, the very rugose propodeum, with



its two small yellow dots; its black dull roughened antennæ, with the sutures very distinct; by the black supra-clypeal region, and the black edged clypeus.

**Gorytes simillimus**, Smith.

*G. simillimus*, Smith, Cat. Hym. Br. Mus, iv. p. 367. (1856).

"Nova Scotia," (Smith).

**Gorytes canaliculatus**, n. sp.

♀. Body unusually short and stout; head black; vertex elevated more than usual; finely punctured; orbits broadly yellow, clypeus black, yellow on the sides, labrum yellow; mandibles yellow; antennæ black above, yellow beneath. Prothorax yellow, tubercles yellow, with no spots behind; two distinct submesial impressions on the front edge of meso-scutum; scutellum with the usual yellow band. Propodeum unusually rough and coarsely striated; enclosure very distinctly triangular, with four unequal irregular coarse rugæ on each side of the distinct mesial furrow; on the flank and diverging from the middle, are large unequal, close set rugæ, with smaller transverse rugæ between; posteriorly towards the insertion of the abdomen is a net-work of unusually large deep fossæ. Wings clear, nervures fuscous, pale testaceous on the costa, pterostigma pale, 3d costal darker; tegulæ testaceous, femora black, tipped with fuscous, fore and middle pairs yellow beneath, fore tibiæ pale yellow, black beneath; hind tibiæ fuscous, with a dark brown spot within at tip; fore tarsi yellow, with broad setose hairs on the joints; hind tarsi fuscous, darker towards the ends of the joints. Abdomen shorter and broader than usual, a yellow band on the base excavated in front; 2d band very irregular on the edge; 3d and 4th slightly interrupted on the mesial line; tip black, quadrangular, sides squarer than usual, surface convex, with a few coarse punctures.

Length, .36 inch.

Unusually short and broad, differing from *G. atricornis* by its antennæ being yellow beneath, by the yellow mandibles, the very coarse irregularly striated propodeum, with the deep mesial furrow, without any smooth yellow spots on the flanks; its testaceous costa, pale yellow legs, yellow orbits, where in the succeeding species they are entirely black, and by the unusually coarsely punctate quadrangular tip.

**Gorytes atricornis**, Pack.

*Odynerus? atricornis*, Harr., Cat. Ins. Mass. p. 68. (1835).

♂ and ♀. Body black, head smooth and polished, front black, orbits yellow, supra-clypeal region black, clypeus yellow, sometimes black,

with two yellow spots; mandibles and palpi black; ♂ antennæ deep black, scape yellow beneath and above at tip; ♀ flagellum red beneath, black above. Thorax black, prothorax yellow above; tubercle and spot behind yellow; scutellum striped with yellow behind, often wholly black; propodeum polished, with about seven large, raised, straight striæ, very equal in size, on each side of the very narrow mesial furrow; posteriorly a smooth yellow area on the middle of the flanks. The striæ are unusually straight and continuous, with no cross striæ between them; free from pubescence; ♂ much smoother, more polished than ♀, with a deep mesial furrow. Tegulæ dark, nervures dark, especially on the costa; pterostigma reddish, 3d costal clouded; fore femora black, tipped, or striped their whole length yellow; middle and hind femora black, slightly fuscous, yellow at tip; tibiæ yellow, black above, hind tibiæ black on the terminal half; two anterior pairs of tarsi yellowish, posteriorly fuscous, ♀ with the hind basal joint fuscous at base. Abdomen deep black, with a broad yellow band, widening on the sides, on the remaining rings the yellow bands, especially in the ♂, are wider than usual, tip, or 6th ring, with a thick powdery greyish pubescence, ♀ tip black, supraanal area triangular, of the usual size.

Length ♂, .34; ♀, .48 inch.

Maine, August, on *Spiræa alba*, (Packard). Mass., (Coll. Harr., Ent. Soc. Phil.).

Differs in its black head, yellow clypeus, black mandibles and palpi, black antennæ, the peculiar sculpturing of the propodeum, and the unusually broad lines on the abdomen; also in the black costa and in the clear wings, which are clouded only near the 3d costal. From *G. phaleratus*, which it resembles, it may be distinguished by the small dots on the propodeum, by the more regular striæ, and the absence of the usual transverse striæ between the longitudinal ones.

*Gorytes flavicornis*, Packard.

*Odynerus? flavicornis*, Harr. Cat. Ins. Mass., p. 68. (1835).

♂ and ♀. Head smooth and highly polished, with a brown pubescence; orbits yellow; entire clypeal region yellow, with a thin pubescence, edge emarginate, testaceous, mandibles yellow, tipped with black, antennæ with the scape yellowish beneath, flagellum fuscous beneath and at base above, brown towards the tip; whole body of a rich polished brown, with a paler pubescence. Prothorax with a yellow stripe, tubercle yellow, with a minute yellow dot, edge of meso-scutum tinged with reddish just behind the tegulæ; scutellum with a narrow yellow stripe on the hind edge, which is irregular on the front edge; propo-

deum smooth and polished throughout like the rest of the thorax; the enclosure indistinctly triangular, smooth, a small square yellow spot on each side near the insertion of the abdomen. Tegulæ fuscous, wings rather thickly clouded, less so on the outer edge; nervules dark brown, costal nervure and pterostigma pale testaceous, fore femora fuscous, middle and hind femora darker above; hind femora black above on the basal two-thirds; tibiæ fuscous yellow, beneath yellow; tarsi throughout honey-yellow. Basal joint of the abdomen with a broad yellow stripe, bordered broadly in front with red; remaining rings with a narrow yellow band on the 3d and 4th segments, interrupted in ♂. Tip of ♂ pale fuscous, of ♀ red, with a narrow triangular shallow groove, nearly twice as long as broad.

Length, ♂, .38; ♀, .48 inch.

Maine, common in August, (Packard). Mass., (Coll. Harris). (Coll. Norton). (Coll. Ent. Soc. Phil.). Shurtleff, Sanborn.

Its rich brown tint, with the paler peach-like bloom or soft pubescence, the dark clouded wings, which contrast well with the pale costa, the broad yellow basal band on the abdomen, bordered with red anteriorly, and the pale fuscous antennæ, characterize one of our most common species.

#### *Section C.*

This group, comprising so far as known to us, but a single species, is characterized by the very short, thickened antennæ, and the plain tip of the abdomen, which is not ridged. Its body also is very short and thick, the thorax rounded, subglobular, the sides of the propodeum are tumid; the tarsi are short, and the clypeus is broad and short, and unusually angulated.

*Gorytes denticulatus*, n. sp.

♀. Body stout and thick, coarsely punctured; head black, coarsely punctured, orbits yellow, clypeus unusually broad, angular, not rounded so much as usual, front emarginate, edge sinuate, black; labrum short, yellow; mandibles black, palpi black at base, terminal half fuscous; antennæ unusually short and stout, scape very thick, terminal joints of flagellum beneath slightly denticulate, especially the 3d and 5th from the end, black, scape yellow beneath. Thorax black, very convex above, coarsely punctured like the head; prothorax yellow, tubercle large yellow, with an oblong yellow spot behind it; sides of the meso-scutum next the tegulæ reddish. Scutellum with a broad yellow band; propodeum tumid, spreading out unusually far on the sides; enclosure very small, not very distinct, with three slight parallel very

regular rugæ on each side of the rather broad mesial furrow, which is deep, with transverse rugæ on the side; posteriorly covered with a network of close set distinct punctures, a smooth surface with fine hirsuties on the flanks, where is a long oval yellow spot. Costal half of the fore wings clouded, especially towards the 3d costal, where it is violaceous, costal nervure testaceous, including pterostigma. Legs throughout reddish, including the trochanters and tip of coxæ; middle tibiæ tipped with yellow, and middle tarsi yellow; hind tarsi fuscous. Abdomen coarsely punctured, segments mesially convex, sutures deeply impressed, with the usual yellow band, of which the basal one is much broader than the others; tip broad convex, not ridged, surface deeply punctured.

Length, .36 inch.

Louisiana, (Coll. Ent. Soc. Phil.).

Its thickened denticulate antennæ, coarsely punctured body, angulated clypeus, violaceous dark spot on the sub-costal cells; the coarsely punctured propodeum, except the small indistinct enclosure, with its regular striæ, and the large ovate lanceolate stripes on each side, will readily distinguish this very interesting species.

#### Section D.

♂. Body stout and thick, *Monedula*-like; the eyes are much longer and more excavated than usual, front very narrow, much elongated in front of the antennæ; clypeus square, as long as broad. Head unusually short, and vertex high and narrow resembling that of *Larra* and *Monedula*; propodeum very short and tumid, broad, basal joint of abdomen unusually broad, resembling *Monedula* in this respect. Legs long and slender; the 3d sub-costal cell is much elongated. In all these characters the only species of the section yet known to us shows some remarkable affinities to some of the members of the two succeeding families; this species more strikingly resembling *Monedula* than any other genus.

*Gorytes moneduloides*, n. sp.

♂. Body black, smooth and polished; head with the front depressed below the level of the eyes; ocelli far apart; front very narrow; orbits and supra-clypeal region yellow; clypeus square, yellow, front edge black; labrum of the usual size, but short, testaceous; mandibles reddish; eyes very large, slightly indented; antennæ unusually clavate, greatly thickened towards the tip; scape yellow beneath, tipped with yellow above; flagellum reddish beneath at base; prothorax with a long broad yellow stripe; sides of meso-scutum yellow; a small dot be-

hind the large yellow tubercle; two dots on the scutellum, and a yellow stripe on the meta-scutellum. Propodeum very broad short, tumid on the sides; enclosure small, thickly but rather finely punctured, but not striated; sides smooth and polished, with a dense, fine hirsuties, and a deep mesial impression. Tegulæ testaceous; wings unusually long, cells elongate, especially the outer subcostal which is nearly twice as long as usual; the outer margin is unusually oblique. Legs reddish throughout, tibiæ yellowish above, fore femora yellowish towards tips beneath; basal joint of abdomen unusually broad, resembling that of *Monedula*; on all the segments is a pair of unusually broad yellow bands, six in number, those on rings 2—3 dilating on the front edge of the sides, which is somewhat sinuate.

Length .42 inch.

Louisiana, (Coll. Ent. Soc. Phil.).

In the very clavate antennæ, very narrow front, its long legs and wings, broad basal abdominal ring like that in *Monedula*, and in the two dots on the scutellum, the striped meta-scutellum, the yellow margin of the scutum, and small triangular punctured enclosure, with the short, tumid, smooth, posterior part of the propodeum; the long legs, with the tarsi concolorous with the rest of the legs, together with the remarkably narrow clypeus, short head, the front sunken below the level of the eyes,—are characters indicating its relationship to the *Bembecidæ*, and easily separating it from any of the preceding species.

#### DESIDERATA.

*Gorytes bipunctatus*, Say, Long's Exp. App. p. 338. (1824).

Smith, Cat. Hym. Br. Mus. iv. p. 367. (1856).

"Pennsylvania," (Say).

*Gorytes nigrifrons*, Smith, Cat. Hym. Br. Mus. iv. p. 368. (1856).

"Nova Scotia," (Smith).

*Gorytes placidus*, Smith, Cat. Hym. Br. Mus. iv. p. 368. (1856).

"East Florida," (Smith).

*Gorytes rufipes*, Smith, Cat. Hym. Br. Mus. iv. p. 368. (1856).

"East Florida," (Smith).

*Gorytes apicalis*, Smith, Cat. Hym. Br. Mus. iv. p. 367. (1856).

"Georgia," (Smith).

*Gorytes divisus*, Smith, Cat. Hym. Br. Mus. iv. p. 370. (1856).

"Georgia," (Smith).

**OXYBELUS**, Latr.*Oxybelus*, Latr., Hist. Nat. xiii. (1805).

♂ ♀. Head short and broad, less than half as broad as long; front as broad below as above; clypeus with a narrow basal elevated ridge; antennæ short, thickening towards the end, bent as in *Crabro*, second joint moderately long, thickened, third conical; mandibles narrowing rapidly, on the outer third not toothed; thorax globular, prothorax short and broad; the scutellum is very short linear, transversely appressed to the meso-scutum and much raised from the scutum, somewhat angulated in front; mesothorax angulated in front; scutum shorter than broad, somewhat rounded below; scutellum sublunate, half as long as broad. Scutellum with a lateral membranous, triangular, acute appendage, which is ciliated within; propodeum nearly as long as broad, rapidly narrowing towards the insertion of the abdomen, with a basal hollow spine. The tergum is margined with a raised ridge, and a parallel ridge within encloses the triangular area.

The middle coxæ are very much shorter than the hind pair. Trochanters nearly twice as long as broad. Legs stout; fore femora swelled; fore tibiæ slender, with a row of setæ, and a large apical spur. The tarsi are long, all the joints with terminal setæ, 1st and 2d joints with spine-like setæ without; hind tibiæ with several rows of setæ; spurs long and slender; 1st joint equal to the length of the 2d, 3d and 4th joints; pterostigma narrow, costa within not thickened. Primaries broad, outer margin straight; the 2d costal space is broader than in *Crabro*, and the subcostal nervure is very distinct beyond it. The lower side of the 1st subcostal space is obsolete, the space not being oblong but irregular, since the inner side of 2d costal space is shorter. The 2d submedian space is not more than half as broad as long, and the inner margin is indented at the termination of the internal vein. Secondaries broad, broadly lobed near the base.

Abdomen cordate, being stout and broad, convex beneath, shorter in ♀, the base flattened and very slightly excavated; coloration black, abdominal spots on the side; the short, broad body, short antennæ, short spherical thorax, square in front, and bulging out at the sides, the cordate abdomen, and broad, flattened first joints distinguish this genus. The ♂ is half the size of ♀, but the two sexes differ very slightly otherwise, no anal stylets in ♂ apparent.

*Synopsis of the Species.*

- A. Abdominal fasciæ nearly contiguous.....*O. similis*, Cress.

**B. Abdominal fasciæ remote; tip of abdomen red.**

Species large, scutellum with two quadrant-shaped yellow spots.....

.....*O. latus*, Say.Two terminal rings of abdomen red.....*O. analis*, Cress.Appendages to the meta-scutellum oval.....*O. emarginatus*, Say.**C. Tip of abdomen black.**

Fore tibiæ red in front; legs black, appendages to meta-

scutellum small, sinuate, mucronate.....*O. interruptus*, Cress.

Very small, propodeum finely lineated, no distinct triangular area.....

.....*O. parvus*, Cress.

Spine undivided, propodeum lineated, not ridged on the

sides; abdomen coarsely punctured.....*O. mucronatus*, Pack.Body coarsely punctured; propodeum rugose.....*O. 4-notatus*, Say.*Section A.****Oxybelus similis*, Cress.***O. similis*, Cress., Proc. iv. p. 476. (1865).

Colorado Territory, (Ridings, Coll. Ent. Soc. Phil.).

*Section B.****Oxybelus latus*, Say.***O. latus*, Say, Bost. Jour. Nat. Hist., i, p. 375. (1837).

Smith, Cat. Hym. B. M. iv. p. 390. (1856).

♀. Front rather narrow, spreading out at the insertion of the antennæ; vertex more elevated and convex than in *O. mucronatus*, not so finely punctured and more polished; a thin pubescence in front, mandibles fuscous, black at tip; antennæ pale reddish, 2d joint of scape blackish, reddish at each end; prothorax smooth above, well carinated, distinctly angulated on the sides; yellow on each side. Thorax thickly but not very coarsely punctured, shining; two quadrant-shaped yellow spots on the scutellum, two flattened horizontal mucronate spines connected by a thin testaceous membrane on the meta-scutellum, and two curved parallel lines of membrane going to the insertion of the hind wings. Propodeum with the basal spine as usual, no diverging lines, but broad polygonal fossæ instead; sides striated, bounded externally by a high prominent ridge beyond which the flanks are densely and evenly striated; posteriorly in the apex of the v-shaped space the striæ are nearly obsolete. Tegulæ testaceous; veins ferruginous; legs deep black, anterior tibiæ reddish; tarsi brown, ungual joint reddish; middle and posterior tarsi black-brown; tibiæ very stout and thick, not so heavily spined as in *O. mucronatus*. Abdomen very short and thick, cordate-triangular, scarcely longer than the thorax alone, with the usual yellow spots, those posterior to the first being sub-geminate; tip broad spatulate, broader than usual, red.

Length, .32 inch.

Illinois, (Coll. Ent. Soc. Phil.). North Carolina, (Hentz, Harr. Coll.).

This is the largest and stoutest species yet known to us. Its red antennæ and the red tip of the abdomen, the very short black legs, with dark tarsi, except the reddish ungual joint, the very short and broad abdomen, scarcely longer than the thorax, the shiny crust, and quadrant-shaped yellow spot on the scutellum, will further distinguish it. Its head is also higher and more convex on the vertex, less coarsely punctured and less thickly pubescent than in *O. mucronatus*.

Our specimens agree well with Say's description, though nearly twice as large as his, which, according to his statements, measured one-fifth of an inch. Otherwise, except in not noticing the regular, quadrant-shaped yellow spots in the meso-scutellum, our specimens correspond well.

A specimen of *O. lætus* collected by Hentz in North Carolina, has the antennæ entirely fuscous, and the quadrant-shaped spots much smaller than in the specimens from Illinois.

*Oxybelus analis*, Cresson.

*O. analis*, Cress., Proc. iv. p. 149. (1865).

Cuba, (Coll. Ent. Soc. Phil.).

*Oxybelus emarginatus*, Say.

*O. emarginatus*, Say, Bost. Jour. Nat. Hist., vol. i, p. 375. (1837).

Harr., Cat. Ins. Mass. p. 68. (1855).

Smith, Cat. Hym. Br. Mus. iv. p. 390. (1856).

♀. Front very narrow, densely punctured, punctures of moderate size, silvery from the ocelli down; head a little shorter and vertex a little more elevated and convex than in *O. analis*; clypeal region longer than usual, mandibles testaceous reddish, outer fourth blackish; antennæ short and stout, scape black, two terminal joints testaceous at tip; flagellum glaucous brown above, sericeous; beneath whitish testaceous. Prothorax well carinated, angular on the sides, smooth above, sericeous, pale yellow on the sides, meso-scutum densely, coarsely punctured, pilose, scutellum with a raised mesial line, and remote lateral yellow dots on each side; meta-scutellum with a mesial ridge, and a few transverse rugæ on each side; membraneous expansions oval emarginate, with a sharp latero-terminal mucro excavated at the end. Propodeal spine large, square, broadly bifurcate at tip, surface channeled, with high, thin sides. Propodeum with fine, regular rugæ diverging from the base, limited posteriorly by an oblique lateral ridge; posteriorly the rugæ run transversely on each side of the mesial furrow into an elongated hexagon. Tegulæ reddish testaceous; nervures dark



ferruginous, femora black, densely sericeous, yellow towards the tip, especially the anterior pair, which are one-third yellow; anterior tibiæ yellow; two hinder pairs black, yellow at base; tarsi black-brown, unguital joints fuscous. Abdomen of the usual width and size, densely punctured, at base two yellow spots, and those on succeeding rings geminate; hind edge of rings very narrowly reddish; tip with a dense line of hirsuties, broad, unusually large, triangular, nearly as broad at base as long, surface flat, sides high.

Length, .14—.20 inch.

♂. Differs from the female in having whitish tarsi and the tip of the abdomen being scarcely fuscous, while the front of the head is a little narrower.

Pennsylvania, New Jersey, Illinois, (Coll. Ent. Soc. Phil.). Mass., August 15, Harr., (Coll. B. S. N. H.). Indiana, (Norton).

The narrow front, the antennæ which are testaceous beneath, the laterally carinated prothorax, the broad, ovate, membranous expansion on the meta-scutellum, the broad bifurcate spine, and the broad, red, abdominal tip, are good distinguishing marks for this species. In many respects it closely approximates *O. analis* Cress., from Cuba, and represents that species in our Atlantic States.

One minute specimen from Illinois is but .14 inch long, with the abdominal fasciæ obsolete. The individuals of this genus vary remarkably in size.

#### *Section C.*

***Oxybelus interruptus*, Cresson.**

*O. interruptus*, Cress., Proc. iv. p. 475. (1865).

Colorado Territory, (Ridings, Coll. Ent. Soc. Phil.).

***Oxybelus parvus*, Cresson.**

*O. parvus*, Cress., Proc. iv. p. 476. (1865).

Colorado Territory, (Ridings, Coll. Ent. Soc. Phil.).

***Oxybelus mucronatus*, n. sp.**

♂. Front broad, densely and coarsely punctate, densely, silvery pubescent, a prominent black protuberance between the antennæ, which are black, becoming brown on the outer half of flagellum. Mandibles black at tip, ferruginous in the middle. Prothorax coarsely punctate above, scarcely carinated, angular on the sides, with two remote yellow spots, nearly contiguous to the yellow non-ocellated tubercle. Thorax coarsely and densely punctured, not hairy; scutellum black; two acutely, remote, thin expansions, not united, with two pairs of lateral, curved, parallel, testaceous, membranous lines, going to the insertion of the wings. On the base of the propodeum the parallel rugæ diverge

outwards, mucro as usual, no distinct mesial line; near where the rugæ or shallow furrows break up posteriorly into fossulets is an oval mesial line, on each side of which are transverse rugæ. Fore femora whitish on the outer and terminal half; two hind pairs black; two anterior pairs of tibiæ white, lineated with black beneath, anterior tarsi testaceous brown, posterior pairs darker. Tegulæ testaceous, nervures black; the usual lateral white lines on the sides of the abdomen, those succeeding the basal pair of short spots being distinctly geminate; tip bidentate, black.

Length, .30 inch.

♀. Differs in its wider front, while the silvery pubescence is not so distinctly limited above. The prothorax is usually immaculate, the eyes are much darker; the fore femora being black, slightly tipped with white, and the fore tibiæ only white at base, tip of abdomen triangular, subacute, black.

Length, .32 inch.

Pennsylvania, Illinois, (Coll. Ent. Soc. Phil.).

Its broad front, black antennæ, black-tipped abdomen, and white legs, the diverging parallel rugæ at the base of the propodeum, and the black scutellum, sufficiently distinguish this species.

*Oxybelus 4-notatus*, Say.

*O. 4-notatus*, Say, Long's Second Exp. App. p. 338. (1834).

Harr., Cat. Ins. Mass. p. 68. (1835).

Smith, Cat. Hym. Br. Mus. iv. p. 390. (1856).

♂. Front a little broader than in *O. emarginatus*; ocelli further apart, but the surface is punctured in the same manner; the eyes are smaller, front densely silvery, interantennal ridge distinct and unusually prominent, compressed; mandibles black; scape of antennæ black, flagellum brown, subfuscous towards the extremity, sericeous. Prothorax scarcely carinate, angular on the sides, touched with yellowish, adjoining the yellowish tubercle. Thorax very densely and coarsely punctured, not polished, dull colored, no mesial ridge present on the scutellum or meta-scutellum, which last bears two mucronate, narrow, small scutello-triangular, membranous appendages, which are much smaller than usual. Spine very narrow, long, deeply grooved, entire at tip, sides parallel, slightly irregular, but generally parallel, ridges diverge on each side of the anterior half of the propodeum, limited laterally by the usual oblique prominent ridge; below are transverse unequal ridges on each side of the broad, flat, triangular, mesial furrow. Tegulæ testaceous, nervures dark ferruginous, femora black, fore pair tipped with yellow; fore and middle tibiæ yellow externally,

hind tibiae yellow at base, black beyond, with a few spines arranged in rows; tarsi brown, fore pair subfuscous, ungual joint paler. Abdomen shorter and stouter than in *O. emarginatus*, more finely punctured, sericeous, with the usual yellow fasciae; tip submucronate.

Length, .22 inch.

♀. Differs in having paler, more fuscous antennae, black legs throughout, and its fore tibiae are slightly fuscous, tarsi becoming fuscous towards the tip, ungual joint much paler. Fasciae of abdomen smaller, much farther apart, as this region is broader than in ♂. Tip broad spatulate, dark, concolorous with the rest of the abdomen, which is smoother than in ♂.

Length, .24 inch.

New Jersey, (Ent. Soc. Phil.); Dublin, N. Y., (Leonard, Coll. Harris). Indiana, (Norton). Maine, August, very abundant.

Differs from *O. emarginatus* by the dull tip of the abdomen, its four small, narrow, membranous appendages and narrow undivided spine; in the sculpturing of the propodeum and the darker legs, much darker antennae, and its black mandibles and stouter abdomen, while the tegulae are pale instead of reddish testaceous. It is the most common northern species.

#### NYSSON, Latr.

*Nysson*, Latr., Nat. Hist., xiii, p. 305. (1804).

♂. Body coarsely punctured, hardly broader than thorax. Head a little less than half as long as broad, not excavated behind; eyes moderately broad; ocelli placed in a low triangle directly upon the vertex; epicranium narrowing more than usual towards the clypeus, its front margin being a third narrower than the base, sides straight, slightly setose.

Clypeal region half as long as broad, being ovate, larger and narrower than usual, convex, the front of the clypeus itself naked, and slightly thickened and turned up on the emarginate edge. Antennae fourteen-jointed, approximate at base, epicranium between with a tubercle and slight tuft of long setae; flagellum short and much thickened towards the tips; 2d joint short and broad, being half as broad as long; 3d joint distinct, globose, 4th sub-truncate, beneath much hollowed and flattened. Palpi long, joints rather slender.

Thorax sub-globular, convex above; prothorax as broad as the mesothorax, and much more raised than in *Astata* and *Oxybelus* to a level with the head, resembling the Sphecidae in this respect; sides rectangular.

Mesothorax convex above; scutum quadrangular, somewhat shorter than broad; scutellum about half as long as broad; meta-scutellum very short, transversely long linear; enclosure of propodeum sub-triangular, narrowing behind, with lateral notal ridges, and at the base many numerous ridges slightly diverging from the middle on either side, with a lateral, sharp, conical tubercle situated a little behind the middle, in front of the middle pair of legs; flanks of the meso-thorax bulging, being very convex, while those of the meta-thorax retreat suddenly and are flattened; sternal portion of the meso-episternum more produced than the rest of the thorax, and minutely dentated. Primaries with the apex obtuse, outer margin convex as usual; 1st costal space very long and narrow; discal space long, the two lower sides equal in length; 2d costal with the lower sides nearly equal in length, the inner hardly shorter than the outer side; 1st subcostal space longitudinal, one-third as broad as long, irregularly five-sided; 2d subcostal space very small, not reaching to the 2d costal, forming very nearly an equilateral triangle, outer recurrent very sigmoid, the 3d space five-sided, narrowing less than a half of its length upon the 2d costal space; 1st median space more than a third the length of the wing; 2d internal space one-third as broad as long. Secondaries long and narrow, the recurrent that closes the basal internal space is very oblique; coxæ stout, long; trochanters as long as the coxæ are broad; femora flattened, swelled beneath; tibiæ and tarsi long and slender; fore tibia with one large curved spur, larger than the two middle tibial ones; fore tarsi with lateral setæ, some being mere ciliæ; hind tibial spurs very slender, long, unequal; 1st joint of tarsus quite as long as the remaining ones, remaining joints long, triangular; lobes setiferous. Abdomen a little longer than the head and thorax together; a little more than a third as broad as long; 1st joint about as long as broad, sub-triangular; 2d joint beneath very much enlarged, obtusely or acutely angulated on the anterior margin, convex, or somewhat flattened on the lower surface; tip curved downwards and inwards. The anal stylets are rather large and prominent.

In the narrowness of the body this genus is very different from *Oxybelus*. Its front narrowing to the clypeus, and the stout antennæ with the last joint excavated and flattened beneath, and the enlarged, basal ring of the abdomen which is angulated in front, distinguish this genus from its allies.

***Nysson laterale*, Say, MS.***N. laterale*, Harr., Cat. Ins. Mass. p. 68. (1835).

♂. Dull black, coarsely punctured; head not very convex in front, vertex very coarsely punctured, with no hairs. Eyes slightly excavated, front black; orbits and clypeus silvery pubescent; mandibles and palpi black; antennæ clavate, sub-terminal joint much lengthened beneath, terminal joint long, pinched beneath; a few hairs between the sutures, and a silvery pubescence on the prominence between the insertion of the antennæ. Thorax dull black, very coarsely punctured in a specimen from Virginia, except the yellow tubercle. Flanks prominently ridged and very coarsely punctured; propodeum with about twelve parallel ridges on the sublunate enclosure, with transverse ridges between, acutely produced as usual on the side; prominence, on which are coarse parallel rugæ, ending in a spine; posteriorly on the vertical face of the propodeum are about six rugæ, of which the two parallel mesial ones are much larger, converging to the insertion of the abdomen. Tegulæ dark, wings smoky, veinlets blackish; legs uniformly and throughout black, slightly sericeous. Abdomen thick and stout, coarsely punctured, rings polished and smooth on the hind edge, six-spotted, a pair of remote yellow spots on 1—3 rings; tip deep black.

Length, .30 inch.

Virginia, (Coll. Ent. Soc. Phil.). Dublin, N. H., (Leonard, Harr. Coll.). Brunswick, Maine, (Packard).

This species which I find recorded in Dr. Harris' MS. Catalogue of his collection under the above name, in a letter from Mr. Say, can be easily recognized by its dark dull-black body, the six-spotted abdomen, black legs, coarsely rugose propodeum, which has a much smaller spine than in the two succeeding species. It is found apparently much farther north than the others of its genus, and will probably be found to be distributed through New England.

***Nysson aurinetus*, Say.***N. aurinetus*, Say, Bost. Jour. Nat. Hist. i. p. 368. (1837).

Smith, Cat. Hym. Br. Mus. iv. p. 336. (1856).

♂. Front with a well marked prominence between the antennæ, golden pubescent; scape of antennæ reddish, as on the basal joint of the flagellum; remainder brown, terminal joint much pinched in, and slenderer than in *N. lateralis*. Prothorax yellowish-red, extending to the tubercle; meso-scutum very coarsely punctured; scutellum unusually square, nearly as long as broad, with a roundish, reddish-yellow spot; base of propodeum with diverging angular rugæ between the unusually large, lateral tubercle, which is tipped with reddish; posteriorly,

three longitudinal, oval, lanceolate fossæ, with five transverse rugæ, femora black, tipped with pale red, concolorous with the rest of the legs. Abdomen with two broad reddish patches, excavated on their opposite faces; two other pairs of linear reddish fasciæ; edges of rings testaceous.

Length, .40—.50 inch.

Illinois, (Coll. Ent. Soc. Phil.). Louisiana, (Norton).

This species is characterized by the unusually long spine on the testaceous tubercle of the propodeum, the abdominal spots are more equal, antennæ paler, a slight golden pubescence on the thorax, and the edge of rings of the abdomen are more distinctly testaceous than in *N. laterale*.

#### DESIDERATA.

*Nysson 5-spinosus*, Say, West. Quart. Rep. ii, p. 78.

"Arkansas," (Say).

*Nysson armatus*, Cress., Proc. iv, p. 145. (1865).

Cuba, (Coll. Ent. Soc. Phil.).

#### STIZUS, Latr.

*Stizus*, Latr., Gen. Crust. et Ins. iv. p. 150. (1804).

*Hogardia*, St. Farg., Hym. iii. p. 290.

♀. Head above broad oblong; vertex not acute; ocelli placed in an equilateral triangle below the summit of the vertex; front a little narrower, sides more parallel than in *Larra*; supra-clypeal piece slightly carinated; clypeus large, broad, subtriangular, full, surface convex; front edge very slightly excavated; labrum short, very broad, sublunate; mandibles incurved, unusually broad and thick, trigonate at base, very unequally bidentate; lingua short; palpi short and broad, thick; antennæ with the second joint of the scape very short, subspherical; antennæ long, clavate, thickened towards the tip. Thorax subspherical; propodeum with the sides rounded, uniformly curved, with a dense hirsuties. Legs very short, joints thickened, short, strongly spined; wings compared with *Larra* very short and broad, triangular, outer edge being long and very oblique. Abdomen not much longer, one-fourth, than broad, being shorter than usual; above cylindrical, much rounded, beneath somewhat flattened; tip acute, with a distinct, large, long, stout sting.

The species are of large size, being the largest of the group, and are easily known by the hirsute body, stout legs, triangular silvery clypeus, and the very long transverse vertex. The propodeum has a faintly marked triangular enclosure.

***Stizus speciosus*, St. Fargeau and Serv.***Sphez speciosus*, Drury, Exot. Ins. ii. 71. t. 38. f. 1. ♀. (1773).*Vespa tricincta*, Fabr., Ent. Syst. ii. 254, 5. (1793).

Syst. Piez. 254, 5. (1804).

Mus. Dom. Banks. Coll. Linn. Soc.

*Stizus speciosus*, St. Farg. and Serv., Encyl. Meth. x. 496, 1. t. 382. f. 6.*Sphecius speciosus*, Dahlb., Hym. Eur. i. 154. (1845).*Hogardia speciosa*, St. Farg., Hym. iii. 290, 2. (1845).*Stizus speciosus*, Smith, Cat. Hym. Br. Mus. ix. p. 336. (1856).

♀. Head and thorax covered with a remarkably fine, dense russet brown hirsuties; front with a dark ferruginous line in the middle enclosing the anterior ocellus; orbits more yellowish in front of the antennæ; supra-clypeal piece yellow; clypeus yellow on the sides, in the middle and towards the frontal ridge ferruginous, labrum broad, sublunate, yellowish ferruginous; mandibles trigonate at base; very unequally bidentate; 6 setæ on the mesial third beneath; tip black. Antennæ with the scape and basal third of the flagellum ferruginous; remainder black-brown; basal joints tipped slightly with paler. Propodeum russet brown like the rest of the thorax, enclosure large, equilaterally triangular. Legs uniformly ferruginous, femora uniformly tipped with yellowish. Tegulæ and nervures ferruginous; wings yellowish testaceous towards the base; slightly dusky on the outer edge.

Abdomen black, with a ferruginous, oblong, broad band on the under side of the basal ring, three pairs of short yellow bands, divided partially by a deep, irregular, rounded sinus on the front edge, basal band shortest and broadest; a similar band, but much narrower, on the under side of the end of 2d ring; tip deep black, with a broad, spatulate, distinct, supraanal area. Length, 1.10—1.50 inch.

Poughkeepsie, N. Y., (Prof. S. Tenney). Southern States, (Norton). Harrisburg, Va., (Shurtleff). Delaware; Kansas, (Coll. Ent. Soc. Phil.)

Prof. S. Tenney informs me that he has seen this species carrying off *Cicada canicularis*.

***Stizus grandis*, Say.***S. grandis*, Say, West. Quart. Rep. ii. p. 77. (1823).

♀. Body less thickly and coarsely punctured and less hirsute than in the preceding species; front more yellowish; head more ferruginous, paler behind; flagellum a little paler; abdomen entirely red, much more sparsely punctured throughout and thus more polished than *S. speciosus*. Abdomen with the same yellow fasciæ above and beneath, of the same size as in the other species, tip with much less prominent lateral ridges. Length, 1.50 inch.

Texas, (Coll. Ent. Soc. Phil.)

***Stizus Hogardii*, Latr.**

*S. Hogardii*, Latr., Gen. Crust. et Ins. iv. 100. t. 13. f. 12. ♀. (1804).

"St. Farg. and Serv. Encyclo. Mèth. x. 496."

*Hogardia rufescens*, St. Farg., Hym. iii. 289. I. t. 28, fig. 5. (1837).

*Stizus Hogardii*, Cress., Proc. iv. p. 145. (1865).

♀. Front a little narrower, pale ferruginous and in front of ocelli, silvery pubescent; ocelli more contiguous than in the preceding species, diverging broad bands of long silvery pubescence lines the side of the clypeus, which is yellow on the sides and ferruginous in the centre; palpi much as in the preceding species. Antennæ as usual, but a little slenderer at the base of the flagellum. Thorax and basal half of the abdomen, less hirsute than in the other species, uniformly pale ferruginous, including the tegulæ, nervures and legs, which are yellowish pubescent within. Abdomen with stouter lateral setæ than in the other species, basal ring more coarsely punctured than in the preceding species; terminal two-thirds of 3d ring and remainder of the abdomen black; supraanal area much as in the preceding species, without any yellow bands.

Length .80—1.10 inch.

Cuba, (Coll. Ent. Soc. Phil.).

This fine species may be at once known by the immaculate abdomen, the red body and black terminal half of the abdomen, and pale yellowish inner side of the legs; also by its less densely hirsute thorax and redder head, with its beautiful silvery pubescent V on the clypeus.

***LARRA*, Klug.**

*Larra*, Klug, Symb. Phys. Dec. v. (1829).

*Bicyrtes*, St. Farg., Hym. iii. p. 53. (1845).

♂ ♀. Head short and transverse; vertex forming a sharp transverse ridge; ocelli wide apart, the third one removed unusually far down the front, which is rather broad and triangular, compared with *Stizus*. Eyes slightly excavated, large and very prominent; supra-clypeal piece with a large rounded carina; clypeus and labrum much raised, thickened and very prominent; clypeus shorter than broad, excavated on both front and posterior edges; surface very convex, labrum nearly as long as broad, being large, long and convex; front edge slightly rounded; mandibles long, rather slender, trigonate at base, very unequally bidentate, inner tooth much the smallest, lingua long and slender, deeply divided, lobes acute, within setose; 2d joint of the scape slender, not much thickened, otherwise the antennæ are much as usual. Thorax smooth, not hairy, coarsely punctured; propodeum square, with a large equilateral triangular piece, sculpturing very uniform over the entire surface; 3d costal cell shorter and more ovate than in *Sti-*



zus; 2d subcostal cell straighter, more triangular, lower side straighter in the middle instead of towards the end of the cell; 2d median recurrent anastomosing, 3d subcostal much shorter than in *Stizus*. Wings much longer and narrower, outer edge much shorter than in *Stizus*. Legs long and slender, much more so than in *Stizus*; abdomen long and slender, cylindrical above, beneath much flattened, nearly twice as long as the head and thorax together. Tip of ♂ broad and spatulate, with three long setæ; ♀ broad spatulate; no supraanal area.

Differs from *Stizus* in the long, narrow, very prominent labrum, shorter clypeus, broader front, slenderer palpi, the slenderer, smaller body, long abdomen, the ♀ tip of which is without the broad sub-triangular area, which is present in *Stizus* and the family generally.

*Larra uncinata*, Cress.

*Stizus uncinatus*, Say, West. Quart. Rep. ii. 77. (1823). Am. Ent. pl. 2. (1824).

*Larra uncinata*, Cress., Proc. iv. p. 472. (1865).

♂. Head and all the appendages deep uniform dull black; surface with scattered minute punctures; thorax thickly punctured, shagreen-like; propodeum with large, coarse, almost confluent punctures, uniformly scattered over the large, triangular, broad, well marked enclosure and on the flanks. Tegulæ black, paler on the edges; veins black; wings blackish violaceous. Legs black sericeous, tarsi dark fuscous; tibiæ deeply pitted with stout hair-like spines. Abdomen black, polished, minutely punctured, basal two-thirds of 2d abdominal ring pale red; tip with three long spines, sides somewhat hirsute.

♀. Differs in having more filiform antennæ, a broader front, the body less hairy, the sericeous legs, and the obtusely triangular tip of abdomen.

Length of the body, ♂ .60; ♀ .70 inch.

Colorado Territory and Kansas, (Coll. Ent. Soc. Phil.).

The very dark wings, black, coarsely punctured body, and single reddish band on the 2d abdominal segment, will sufficiently distinguish the only species known to inhabit the United States. It is a tropical genus.

DESIDERATA.

*Larra moneduloides*, Smith, Cat. Hym. Brit. Mus. iv, p. 346. (1856).

"St. Johns Bluff, East Florida," (Smith).

*Larra Servillii*, Smith, Cat. Hym. Br. Mus. iv, p. 350. (1856).

*Bicyrtus Servillii*, St. Farg., Hym. iii, 53, 1. (1845).

"North America," (Smith).

*Harpactus insularis*, Cress., Proc. iv, p. 146. (1865).

"Cuba," (Gundlach).

*Harpactus scitulus*, Cress., Proc. iv, p. 147. (1865).

"Cuba," (Gundlach).

**Description of Two New Species of North American Brachycerous DIPTERA.**

BY AUG. R. GROTE.

**SPARNOPOLIUS, Loew.*****Sparnopolius cumatilis*, n. sp.**

Form of *S. fulvus* (Weid.), but smaller. Body thickly and evenly covered with pale greenish sericeous hair, which acquires a brilliant reflection in certain lights, and particularly so on the front. Antennæ black; apical joint a little shorter and thicker than in *S. fulvus*; basal joints clothed with pale yellowish-brown hair. Wings, clear, glassy, opalescent, in the venation agreeing with *S. fulvus*. Legs, dark, thinly covered with short, pale-greenish sericeous pubescence, which, however, is almost wanting on the blackish tarsi. The tegument is everywhere dull blackish.

Five ♀ specimens. Expanse 0.50 inch. Length of body, 0.30 inch.

*Habitat*.—Colorado Territory, (Mr. J. Ridings). Coll. Ent. Soc. Phil.

The peculiar greenish color of this small species will readily distinguish it from its North American congeners.

***Sparnopolius coloradensis*, n. sp.**

Size, small. Body clothed with golden brown hair, of a richer, more golden hue, especially on the front, but resembling that of *S. fulvus* in color, than which *S. coloradensis* is one-half smaller. Antennæ black, basal joints loosely and rather thickly clothed with brown hair mixed with blackish. Terminal antennal joints flattened laterally, appearing wider than usual, with, however, pointed apices. Thoracic surface beneath, and venter, clothed with paler, somewhat greenish sericeous pubescence. Wings, clear, glassy, opalescent; veins a little darker than in either *S. fulvus* or *S. cumatilis*. Legs, dark, thinly clothed with pale sericeous pubescence, which is nearly concolorous with that of the under corporal parts.

Three ♀ specimens. Expanse, 0.45 inch. Length of body, 0.25 inch.

*Habitat*.—Colorado Territory, (Mr. James Ridings). Coll. Ent. Soc. Phil.

Both these little species agree with *S. fulvus*, in structure, as with the characters of the genus given by Prof. H. Loew, in the "Neue Beiträge zur Kenntniss der Diptera, Berlin, 1855." The first posterior cell (cellula posterioris prima) is open, and there are no spinules on the hind femora. The corporal pubescence is comparatively short and thick.

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## ERRATA.

- Page 4, line 18, for *Parorgia* read *Parorgyia*.  
 Page 8, line 21, for *Usually* read *Usually*.  
 Page 9, line 8, for *twany* read *tawny*.  
 Page 13, line 36, for *brighter* read *lighter*.  
 Page 16, line 17, for *scale* read *scales*.  
 Page 17, line 1, for (Plate 4, fig. 10, ♂) read (Plate 3, fig. 8, ♂).  
 Page 28, line 7, for *Plate 3* read *Plate 4*.  
 Page 28, line 7, for *Catacola* read *Catocala*.  
 Page 30, line 17, for (Plate 4, fig. 9, ♀) read (Plate 3, fig. 7, ♀).  
 Page 40, at bottom, for *another* read *authora*.  
 Page 41, line 1, for *to* read *too*.  
 Page 43, line 4 for *stripicola* read *stirpicola*.  
 Page 52, line 11, for *alinged* read *aligned*.  
 Page 53, line 23, for *oppose* read *approach*.  
 Page 57, line 12, and afterwards for *postscutellum* read *metascutellum*.  
 Page 76, line 13, for *Ceratocolus* read *Crabra*.  
 Page 85, line 18, for *in* read *on*.  
 Page 87, line 13, for *actually* read *arcuately*.  
 Page 88, lines 35 and 36, for *in* read *on*.  
 Page 93, line 25, for *semipupal* read *subimago*.  
 Page 93, line 3, for *Leonerd* read *Leonard*.  
 Page 93, line 31, for *Cowper* read *Couper*.  
 Page 97, line 22, for *metascutellum* read *propodeum*.  
 Page 97, line 24, for *metathorax* read *propodeum*.  
 Page 98, line 35, for *scutellum* read *propodeum*.  
 Page 98, line 37, after becoming *insert* *smoother*.  
 Page 104, line 23, for *effossun* read *effossus*.  
 Page 135, line 12, for *Upper* read *Under*.  
 Page 171, line 9, for *Pomera* read *Ponera*.  
 Page 237, line 4 from bottom, for *Pristophora* read *Pristiphora*.  
 Page 248, line 15, for *bud* itself read *twig* itself.  
 Page 254, line 4, for *basal plates* read *lateral plates*.  
 Page 268, lines 24-5, for *scutellatus* read *scutellatus*.  
 Page 289, line 7, for *was* read *were*.  
 Page 296, line 17, for *sinuous* read *sericeous*.  
 Page 297, line 19, for *Euchromia* read *Euchromia*.  
 Page 300, line 4, for *Sphynx* read *Sphinx*.  
 Page 308, line 21, for *Ægeridæ* read *Ægeriidæ*.  
 Page 317, line 10, for *specimen* read *species*.  
 Page 327, (foot note) line 5, for *apellation* read *appellation*.  
 Page 328, for **EUPYRRHOGLOSSUM** read **EUPYRRHOGLOSSUM**.  
 Page 330, line 3, for *diffusa* read *diffusa*.  
 Page 330, (foot note) line 1, for *Eurate* read *Læmocharis*.  
 Page 331, insert *proxima*, Grote, after *guacolda*, Poey.  
 Page 331, after **XYLEUTES** insert *Hübner*.





## PROCEEDINGS OF MEETINGS.

JANUARY 15, 1866.

President FRAZER in the Chair.

Fourteen members present.

The following papers were presented for publication in the Proceedings :

"Synopsis of the genera and species of Pselaphidæ, by Emil Brendel, M. D.

And was referred to a Committee.

Mr. McAllister moved that Chapter 1, Article 6th of the By-Laws be altered to read as follows :

The Officers of the Society shall consist of a President, a Vice President, a Corresponding Secretary, a Recording Secretary, a Treasurer and a Curator, who shall be elected annually on the second Monday in December.

Also, that in Chapter 9, Article 1, the word "special," in the second line, be stricken out.

Laid over.

On Ballot, the following persons were elected Corresponding Members of the Society :

Henry Jekel, and Auguste Sallé, of Paris, France ; Henri de Sausure, of Geneva, Switzerland ; George W. Peck, of New York, and George Hunt, of Providence, Rhode Island.

FEBRUARY 12, 1866.

President FRAZER in the Chair.

Ten members present.

The following donations were received from Rathmell Wilson, Esq. :

One handsome Mahogany Cabinet with twenty drawers.

Ninety-three large quarto book boxes, corked, glazed and elegantly bound.

Also about 20,000 Insect pins.

The following donations to the Library were announced :

From Rathmell Wilson, Esq. :—

Exotic Butterflies, by W. C. Hewitson. Part 55. 4to.

Proceedings of the Zoological Society of London. Parts 2 and 3, 1865. 8vo.

The Zoologist for May, June, July and August, 1865. 8vo.

- Annales de la Société Entomologique de France. 4 sér. Tom. 4, Trim 4, 1864.  
 Revue et Magasin de Zoologie. No. 7-9. 1865. 8vo.  
 Tijdschrift voor Entomologie, pp. 73-105. 1865. 8vo.  
 Nouvi Studii Sulla Entomologia della Calabria, ulteriore memoria del socio ordinario Achille Costa. Napoli 1863. 4to.  
 Scandinaviens Coleoptera, af C. G. Thomson. Tom. 6. 8vo.

From *Aug. R. Grote*, Esq. :—

Remarks on the Sphingidæ of Cuba, and description of a new species of *Ambulyx* from Brazil, by Aug. R. Grote. Pamph. 8vo.

The following paper was presented for publication in the Proceedings :

"Notes on the Zygænidæ of Cuba, by Aug. R. Grote."

And was referred to a Committee.

The amendments to the By-Laws, proposed at the last meeting, were taken up and adopted.

On motion, the thanks of the Society were voted to Rathmell Wilson, Esq., for his liberal donations made this evening.

On Ballot, Mr. E. T. Cresson was elected Curator of the Society.

MARCH 12, 1866.

President FRAZER in the Chair.

Twelve members present.

The following donations to the Library were announced :

An Historical Notice of the Essex Institute. Pamph. 8vo. From the Institute.

Description of *Alypia Langtonii*, and remarks on Canadian Insect Architecture, by Wm. Couper. Pamph. 8vo. From the Author.

On Fossil Insects of Illinois, the *Miamia* and *Hemeristia*, by Saml. H. Scudder. Pamph. 8vo. From the Author.

Nocturnal Lepidoptera found in Canada, by Rev. C. J. S. Bethune. Pamph. 8vo. From the Author.

From *Rathmell Wilson*, Esq. :—

The Natural History of the Tineina, by H. T. Stainton. Vol. 8.—*Gelechia*, Part 1. 8vo.

Annals and Magazine of Natural History. 14 vols. 8vo.

British Museum Catalogues. Lepidoptera. Parts 27—32, by Francis Walker. 12 mo.

Transactions of the Entomological Society of London. 3d series, Vol. 2, parts 3-5; Vol. 3, parts 1 and 2, and Vol 4, part 1. 8vo.

Annales de la Entomolgoique Société de France. 4 sér. Tom. 5, Trim. 1-2, 1865. 8vo.

Stettiner Entomologische Zeitung. 26 Jahr. Nr. 10-12. 1865. 8vo.

Skandinaviens Coleoptera, af C. G. Thomson. Tom. 7. Haft. 1. 8vo.

The following papers were presented for publication in the Proceedings:

"On certain North American species of *Satyrus*, by Wm. H. Edwards."

"Notes from a Journal for 1865, kept at Coalburg, Kanawha Co., West Virginia, by Wm. H. Edwards."

"Coloradian Butterflies, by Tryon Reakirt."

All of which were referred to the Committee on Lepidoptera.

Dr. Samuel Lewis offered the following alterations and amendments to the By-Laws of the Society, which were read and laid over:

Add to Chapter 5 of the By-Laws, the following:—

"ART. 6.—The duties of the Curator shall be to take charge of the collection of the Society; keep the keys thereof, subject to the call of the various Committees, attend to the increase and preservation of the collection, and to report annually on its condition."

Strike out Article 1 of Chap. 7, and insert the following:

"ART. 1.—The keys of the cases containing the collection, shall be kept by the Curator, subject to the call of the members of the Committees attached to the different departments, who with the Curator, shall have the liberty to open the cases, and shall be responsible for all specimens committed to their charge."

Alter Article 4 of Chapter 7, to read as follows:—

"ART. 4.—Should any one be desirous to inspect more closely the specimens in the collection, for the purpose of study or description, he must apply to the Curator or any member of the Committee on that Department."

Alter Article 6 of Chapter 7, to read as follows:—

"ART. 6.—The Curator shall superintend the exchange of duplicates (which must be, in all cases, for the benefit of the Cabinet); but before exchanges are made, he shall see that four specimens of each species are reserved for the Cabinet, all over that number may be considered as duplicates."

On ballot, the following named persons were elected Corresponding Members of the Society:

Agustin Legrand, Jose A. Nieto, A. Boteri, Aniseto Moreno and Francois Soumichrast, of Mexico; Samuel L. Boardman, of Augusta, Maine, and A. B. Russell, A. M., of Shreveport, La.

APRIL 9, 1866.

President FRAZER in the Chair.

Sixteen members present.

The following donation to the Cabinet was made by *Baron R. Osten Sacken*:

18 species (92 specimens) of determined European Cynipidæ, viz:—*Cynips*



*Kollari*, *lignicola*, *calicis*, *lucida*, *radicis*, *scutellaris*, *disticha*, *Andricus inflator* ♂ ♀, *curvator* ♂ ♀, *Teras terminalis* ♂ ♀, *Spathegaster tricolor* ♂ ♀, *Rhodites eglanteria* ♀, *spinosissima* ♀, *Diastrophus rubi* ♀, *Trigonaespi megaloptera* ♂ ♀, *Aulax hierasii* ♀, *canina* ♂ ♀, and *Synergus Kollari* ♂ ♀.

Also a fine collection of larvæ of different orders of insects preserved in alcohol, (see list below).

The following donations to the Library were announced.

From *Baron R. Osten Sacken*:—

Beiträge zur Kenntniss einiger Braconiden-Gattungen von H. Reinhard. 2 Pamp. 8vo.

Deutsche Braconiden von J. F. Ruthe. 2 Pamp. 8vo.

Die Figitiden des mittlern Europa von H. Reinhard. 8vo.

Synoptische Uebersicht der Familien und Gattungen in den beiden Gruppen der *Chalcidiae* Spin. und *Proctotrupii* Latr., von H. Reinhard. 8vo.

Ueber das Flügelgeäder der Dipteren, von Dr. J. R. Schiner. 8vo.

Dipterologische Mittheilungen, vom Dr. H. Loew. 8vo.

Bericht über die neuern Erscheinungen auf dem Gebiete der Dipterologie, vom Dr. H. Loew. 8vo.

Ueber die Arten der Gattung *Clinocera* Meig., von Dr. H. Loew. 8vo.

Ueber die europäischen Arten der Gattung *Silvius*, von Dr. H. Loew. 8vo.

Diptera Americae septentrionalis indigena, descripsit, H. Loew. Centuria prima. 8vo.

Diptera aliquot in insula Cuba collecta descripsit Dr. H. Löw. 8vo.

Bidrag till kännedomen om Afrikas Diptera. Af Director Loew i Miseritz. 3 Pamph. 8vo.

Gymnopternus principalis, eine neue Art, von H. Löw. 8vo.

Notes on certain Insect Larva-Sacs, described as species of *Valvatæ*, by Thomas Bland. 8vo.

From *August Morawitz* of St. Petersburg, Russia:—

Beitrag zur Käferfauna der Insel Jesso bearbeitet von August Morawitz. Erste Lieferung.—*Cicindelidæ* et *Carabici*. Pamph. 4 to.

Vorläufige Diagnosen neuer Coleopteren aus Südost-Sibiren, von August Morawitz.—*Cicindelidæ*, *Carabiceidæ*. Pamph. 8vo.

Vorläufige Diagnosen neuer Carabiceiden aus Hakodade, von August Morawitz. Pamph. 8vo.

Verzeichniss der um St. Petersburg auf gefundenen Crabroninen, von August Morawitz. Pamph. 8vo.

Descriptions des Nouvelles espèces de Lépidoptères de la Collection de l'Académie Impériale des Sciences, par E. Ménétriés. Pamph. 8vo.

Catalogue de la Collection Entomologique de l'Académie Impériale des Sciences de St. Pétersburg. Lépidoptères par E. Ménétriés. 1ère partie, les Diurnes; I 1e partie, les Nocturnes. Pamph. 8vo.

The Entomologists Monthly Magazine. Vol. 1. London 1864—5. 8vo. From the Editors.

Correspondenz-Blatt des zoologisch-mineralogischen Vereines in Regensburg. Neunzehnter Jahrgang. 1865. 1 vol. 8vo. From Dr. Herrick-Schuffer.

Monographie des Chrysomélides de l'Amérique, par C. Stal. 3 parts. 4 to. From the Author.

The following addition to the By-Laws was adopted :

Chap. VI. Art. 4.—It shall be the duty of the Finance Committee to take charge, with the Treasurer, of all monies coming to the Society, and to invest the same; to change any or all of the investments of the Society, whenever it may deem it advantageous to do so, and to report such changes to the Society at its next meeting, with the reasons for making the change.

The Thanks of the Society were voted to Baron R. Osten Sacken, August Morawitz, C. Stal, and Dr. Herrich-Schäffer, for donations made by them this evening.

On Ballot, the following named persons were elected *Resident* Members of the Society: Charles H. Hart, Robert Kilvington.

The following communication was read from Baron R. Osten Sacken :

Among the various collections already formed or forming in the rooms of the Entomological Society, a collection of larvæ as far as I am informed, has not found a place yet. I hope that the small collection of this kind which I offer to-day to the acceptance of the Society, may encourage other collectors to similar contributions.

My collection was gradually, and I may say, unintentionally accumulated in the course of my entomological studies in St. Petersburg and in Washington. Many specimens have been lost during that time through breakage of the bottles or drying up of the alcohol; nevertheless, what remains of it now, little as it is, contains a number of interesting specimens and is still worth preserving. My experience with regard to the preservation of alcoholic collections of larvæ, has led me to the belief, that the only way to insure such a preservation is, to keep the small bottles filled with alcohol and containing the larvæ, immersed in a larger glass vessel or jar, likewise filled with alcohol. Thus the whole collection may be contained in a small number of jars, which are easily kept in view and whenever necessary, refilled with alcohol. By this means the necessity of refilling several hundreds of the small bottles is done away with for many years. When, on the contrary, the ordinary plan is adopted and the small bottles are kept separate in nice little cases or boxes, such an arrangement, advantageous and elegant as it may appear, invariably leads to the disappointment of finding this or that larva dried up from want of alcohol. An imperceptible crack in the bottle or a leak in the cork, in a very few days produces such an accident.

The single specimens of a collection kept, according to my plan, in large jars, can be rendered more accessible by being arranged in groups, according to the families, to which the larvæ belong. The large jar can be divided by horizontal partitions; or small bags can be provided, each to contain a certain number of small bottles (for instance a genus or a family), which bags, properly labelled, would be immersed in the alcohol of the large jar. With the aid of a catalogue, referring to the numbers of the jars and bags, such a collection would be easily accessible to the student. As to the general public, a collection of alcoholic larvæ in most cases affords but very little interest.

With the above recommendations, I give up my little collection to the good care of the Society.

## LIST OF THE LARVAE

Presented to the Entomological Society of Philadelphia.

## COLEOPTERA.

## Cicindelidæ.

40. *Cicindela* sp. (l.)\*—St. Petersburg, Russia.  
 143. *Cicindela* (or *Megacephala* ?) (l.)—North America.

## Carabidæ.

143. *Calosoma* ? (l.)—North America.  
 144. ....—Undetermined larva of this family; from Louisiana; resembles very much the larva figured in the Berl. Entom. Zeitschr. 1859, Tab. IV., fig. 1.  
 145. ....—From Louisiana, Undetermined larva of this family.  
 148. ....—Washington, D. C. Undetermined.  
 3. ....—St. Petersburg. This is either a young larva of *Cepalotes vulgaris*, or that of *Liochiton arcticum*.

## Dytiscidæ.

149. *Cybister* sp. (l.)—Matamoras.  
 32. *Hydroporus* sp. ? (l.)—St. Petersburg; found in water, climbing among *Sphagnum*; it is very probably this genus.

## Hydrophilidæ.

150. *Hydrophilus* sp. (l.)—Matamoras.

## Silphidæ.

101. *Silpha* sp. (l.)—Washington.

## Scarabæidæ.

151. *Copris carolina*, (l. p.)—Described and figured by me in Proc. Ent. Soc. I, p. 105, Tab. I, f. 1.  
 152. *Dynastes* sp. (l. p.)—I am not sure whether this species is from North or South America.  
 22. *Cetonia metallica*, (l.)—St. Petersburg.  
 133. *Serica* sp. (l.)—Communicated by Dr. Horn as being probably a larva of this genus. Agrees very well with Erichson's description.

## Elateridæ.

76. *Fornax orchesides*, (l.)?—Described and figured by me, Proc. etc. I, p. 114, Tab. I, f. 5. It probably belongs to *T. orchesides*.  
 24. *Fornax badius*, (l.)—Described and figured by me, Proc. etc. I, p. 112, Tab. I, f. 4. (Communicated by Dr. Horn).  
 38. *Cratonychus fulvipes*, (l.)—St Petersburg, (Russia.)  
 160. *Melanactes* sp. (l.)—Described and figured by me, Proc. etc. I, p. 125, Tab. I, f. 8. The larvæ come from Louisiana and New Mexico; but larvæ of the same size also occur in the State of New York. Although I have not reared their larvæ, they cannot be anything else but *Melanactes*. They are luminous. (See my note about it in Proc. IV, p. viii).  
 138. *Melanactes* sp. (l.)—Arizona; described by me, Proc. etc. I, p. 128, at the bottom. I have this larva from Dr. LeConte.  
 161. *Alaus myops*, (l.)—Pennsylvania.

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\* l. means larva, p. pupa.

162. ....—Undetermined large elaterideous larva from Cape St. Lucas, California; probably *Chalcolepidius*.

105. ....—Undetermined larvæ; all North American.

#### **Buprestidæ.**

132. *Chalcophora*? (l.)—Abundant in pine stumps in New Jersey, (Dr. Horn.)

140. ....—Undetermined larva of this family from Grafton, Va.

#### **Cebrionidæ.**

139. *Cebrus* sp. (l.)—California.

#### **Rhipiceridæ.**

141. *Zenoa picea*, (l.)—Described by me in Proc. etc. I, p. 107, Tab. I, fig. 2, (Communicated by Mr. Walsh.)

#### **Dasyllidæ.**

150. *Prionocyphon discoideus*.—Described by me, Proc. etc., I, p. 115. (Communicated by Mr. Walsh.)

123. *Ptilodactyla elaterina*, (p.)—Described and figured by me, *ibid.*, p. 109, Tab. I, f. 3. I possess now the pupa only; I do not remember what became of the larva. They were communicated to me by Dr. Horn.

#### **Lampyridæ.**

24. *Lygistopterus sanguineus*, (l.)—St. Petersburg.

163. ....—Undetermined larva, apparently of the tribe *Lycini*.

103. ....—Undetermined North American *Lampyridous* larvæ.

#### **Cleridæ.**

18. *Clerus formicarius*, (l.)—St. Petersburg.

#### **Heteromera.**

90. *Hypophlæus suturalis*, (l.)—St. Petersburg, in pine-wood.

12. *Pyrochroa pectinicornis* (l.)—St. Petersburg.

125. *Centronopus anthracinus*, (l.)—Described by me, Proc. etc. I, p. 123. (Communicated by Dr. Horn.)

147. *Centronopus calcaratus*, (p.)—"Belongs apparently to this species." I find this notice in my manuscript remarks; I do not know on what authority. The pupa agrees with that of *C. anthracinus*.

72. *Phuiona umbrina*, (p.)—Washington, D. C.

99. ....—Undetermined North American Heteromera.

67. ....—Washington, D. C., in rotten wood.

50. ....—Undetermined *Melasomatous* larvæ, found under stones in the Steppes of the Gov't of Ekaterinoslao in Russia.

131. ....—Undetermined North American Heteromeric larva.

126. ....—*Ibid.*

127. ....—*Ibid*, California.

57. ....—Rotten wood, Kharkon, (Russia.)

#### **Longicornia.**

10. *Gracilia pygmaea*, (l. p.)—St. Petersburg.

128. *Arhopalus pictus*, Drury, (l. p.)—Described and figured by me, Proc. etc. p. 121, Tab. I, fig. 7. Compare also Walsh, l. c. V, p. 204.

135. *Parandra brunnea*, (l.)—Described and figured by me, l. c. I. p. 118, Tab. I, fig. 6. Communicated by Dr. Horn.

69. *Psenocerus supernotatus*, Say, (l.)—Described by me, l. c. I, p. 122.

130. *Callidium* (probably *luridum*) (l.)—St. Petersburg.

136. *Mallodon* (?) (l. p. i.)—I found larva, pupa and imago in the bottle, among some collections brought from New Mexico. This probably indicates that they belong together.

#### Chrysomelinæ.

46. *Donacia* sp. (l.)—St. Petersburg.

88. *Lina scripta*, (l.)—Ibid.

82. *Chrysomela similis*, (l.)?—On *Asclepias*, Washington, D. C. I suppose these larvæ belong to *C. similis*.

42. *Cryptocephalus* sp. (l.)—St. Petersburg.

#### Curculionidæ.

142. ....—Larvæ found in acorns, (Washington, D. C.)

#### Erotylidæ.

98. *Dacne fasciata* ? (l.)—Found in a boletus in Pennsylvania. The large larva is very probably that of *Dacne*, although Candéze's description is too short for a thorough comparison. Whether the smaller larvæ belong to the same species is uncertain.

#### Coccinellidæ.

83. *Epilachna borealis*, (l.)—Described by me Proc. I, p. 125. Very common on pumpkin leaves.

#### DIPTERA.

111. *Tanytus* ? (l.)—Washington, D. C.

117. *Chironomidous* larva.—Ibid.

118. Ibid.—Ibid. Different from the preceding.

1. *Ctenophora atrata*, (l.)—St. Petersburg; in birch-wood.

7. *Ctenophora bimaculata*, (l.)—Ibid.

20. *Pachyrhina pratensis*, (l. p.)—Ibid.

115. *Pachyrhina* ? (l.)—Washington, D. C.

114. *Tipula*, (l.)—Ibid.

122. *Tipula*, (l.)—Ibid. Larva remarkable by its horny appendages.

113. *Psychoda*, (l.)—Washington; the perfect insect of this larva is a small, gray species, with spotless wings.

120. *Cecidomyia pini inopis* O. S.—Washington; described by me in the Monographs etc. I, p. 196.

78. *Simulium*, (l. p.)—Washington.

84. *Leja* ?—Virginia; under the bark of a tree; this is the larva mentioned by me Proc. etc. II, p. 162 at the bottom.

54. *Mycetophila lunata* (or *signata* ?)—St. Petersburg.

59. *Sriophila limbatella* Zett., (l.)—Ibid.

58. *Bolitophila cinerea*, (l.)—Ibid.

119. *Sciara toxoneura*, (l.)—Washington, D. C. Described by me in Proc. etc. II, 165.

64. *Sciara*, (l.)—Washington.

16. *Sciara*, (l.)—St. Petersburg.

41. *Bibio albipennis*, (l.)—St. Petersburg; in rotten wood.

73. *Bibio* sp.—Virginia.

80. *Rhyphus punctatus*, (l.)—St. Petersburg.

116. *Rhyphus punctatus*, (l. p.)—North America.

86. *Xylophagus* sp., (l.)—Washington.

121. *Sargus decorus*, (l.)—Ibid.

21. *Pachygaster ater*, (l.)—St. Petersburg.  
 35. *Oxycera*? (l.)—Ibid.  
 129. *Laphria* sp., (very probably *L. flava*.—St. Petersburg; under the bark of *Pinus abies*.  
 75. *Laphria*?—Louisiana; beautiful and remarkable larva.  
 19. *Eristalis*, (l.)—St. Petersburg; under the bark of dry stumps of *Pinus abies*.  
 37. *Syrphus vitripennis* M. or allied species, (l.)  
 70. *Oestridous* larva.—New York.  
 155. *Cephenemyia*.—Missouri.  
 91. *Oestridous* larva.—Khirgiz Steppes, Asia.  
 87. *Dermatobia* sp.—Honduras; this is the so-called *Oestrus hominis*; the larva is figured in Brauer, *Oestriden*, Tab. X, f. 2. I owe this larva to Dr. LeConte.  
 63. *Anthomyia* sp.—St. Petersburg; one of the curious fringed larvæ of this section.  
 48. *Sarcophaga* (probably *carriaria*.)—St. Petersburg.  
 74. ....—Undetermined *Muscidous* larva.  
 71. *Lonchæa* sp. (l. p.)—St. Petersburg; under the bark of trees.  
 95. *Drosophila amœna*, Lw., (l. p.)—Washington.  
 49. *Sepsis* sp. (l.)—St. Petersburg.  
 110. *Phytomyza clematidis*, Lw., (l.)—Washington; larva burrowing in the leaves of a *Clematis*.

#### OTHER ORDERS.

9. *Panorpa communis*, (l.)—Europe; given to me by Mr. Brauer in Vienna, the discover of this larva.  
 160. *Myrmeleon*.—Virginia.  
 5. *Osmylus maculatus*.—Europe.  
 134. *Pelopæus*.—Washington; found in the nest of *Pelopæus* and hence, probably its larva.  
 107. *Eumenes*.—Washington; larva found in the nest of this species.

MAY 14, 1866.

President FRAZER in the Chair.

Twelve members present.

A donation was announced from *Charles N. Bancker, Esq.*, consisting of sixteen packages of Insect pins.

The following donation to the Library was made by *Rathmell Wilson, Esq.*:

Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wein. Jahr. 1864, XIV. Band. 8vo.

Berliner Entomologische Zeitschrift. 1865. 8vo.

Histoire des Insectes (Suites à Buffon.)—Coléoptères. Tome VII. Par M. Th. Lacordaire. 1 vol. with plates. 8vo.

Annales de la Société Entomologique de France. 4e ser. Tome 5, Trim. 3. 1865. 8vo.

Transactions of the Entomological Society of London. 3d series, vol. 5, part 1. 1865. 8vo.

The Journal of Entomology. Nov. 1865. Vol. 2, No. 13. 8vo.

The following Papers were presented for publication in the Proceedings:

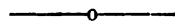
"Descriptions of new species of North American Formicidæ, by S. B. Buckley."

"Prof. Dana and his Entomological Speculations, by Benj. D. Walsh, M. A."

"On the Insects Dipterous, Hymenopterous, Coleopterous and Lepidopterous, inhabiting the galls of certain species of willow, Part 2, by Benj. D. Walsh, M. A."

And were referred to Committees.

On ballot, Mr. Alvey Augustus Adeë, was elected a *Corresponding* member of the Society.



JUNE 11, 1866.

President FRAZER in the Chair.

Eight members present.

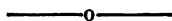
The following donations to the Library were announced:—

Proceedings of the Chicago Academy of Sciences, Vol. I, pp. 1—48, 1866, 8vo. From the *Academy*.

Transactions of the Academy of Sciences of St. Louis, Vol. II, No. 2, 1866, 8vo. From the *Academy*.

Die Schmetterlinge der Insel Cuba nach natürlichen Exemplaren und Notizen des Herrn Dr. Gundlach in Habana zusammengestellt von Dr. Herrich-Schäffer. Erste Lieferung: Tagfalter und Schwärmer, 1864 und 1865. From the *Author*.

Systematisches Verzeichniss der Schmetterlinge von Europa, von Dr. Herrich-Schäffer, 1862. From the *Author*.



JULY 9, 1866.

President FRAZER in the Chair.

Ten members present.

The following donation to the Cabinet was announced:—

Thirty-nine specimens of seventeen species of COLEOPTERA, (*Cicindela oregona*, *C. pusilla*, *C. guttifera*, *Opisthius Richardsonii*, *Calosoma semilaeve*, *C. cancellatum*, *C. discors*, *Cychrus angusticollis*, *C. punctatus*, *Paydrus piceus*, *Platynus maculicollis*, *P. ferrugineus*, *Chlaenius variabilipes*, *Stenolophus californicus*, *Anisodactylus ptychrous*, *Bembidium nebraskense*, *Amphizoa insolens*,) from GEO. H. HORN, M. D.

The following donation to the Library was announced :—

From *Rathmell Wilson, Esq.*

Illustrations of Diurnal Lepidoptera. Part 2—*Lycænidae*. By Wm. C. Hewitson. London, 1865. 4to.

Exotic Butterflies. By Wm. C. Hewitson. Part 56. 4to.

Essai d'une Faune Entomologique de L'Archipel Indo-Neerlandais, par S. C. Snellen Van Vollenhoven. Seconde Monographie: Famille des *Pierides*. 4to.

Iconographie et description de Chenilles et Lépidoptères inédits, par P. Millière. Tome Deuxième, Treizième Livraison, Paris, 1865. Royal 8vo.

Annales de la Société Entomologique de Belgique. Tome Huitième. Bruxelles, 1864. 8vo.

Tijdschrift voor Entomologie. Achtste Jaargang. 5—6 Aflevering, 1865. 8vo.

The following Paper was presented for publication in the Proceedings :—

"Descriptions of new species of *Pselaphidæ*, by Emil Brendel, M. D."

And was referred to a Committee.

The following letter from Mr. Chas. Sartorius, of Mexico, addressed to the Corresponding Secretary, was read :—

Dear Sir :—From your letter of the 19th of October, I see that the circumstance of the springing seeds is known without the cause. From the name which you give the Plant, that produces these seeds, it would appear that the same phenomena occurred with other plants. In this neighborhood it is a tree belonging to the *Euphorbiaceæ*, which bears the vulgar name, *palo lechudo*, i. e. "milky tree," and which occurs commonly in the forests, but only at an elevation of two thousand to three thousand feet above the surface of the sea. The tree does not attain a great thickness, the trunk measuring 6—8 inches in diameter, and a total height of 6-8 yards. Branches and stem are alike lactiferous, the milky fluid affecting the skin corrosively. Three years since, I heard of the dancing seeds, and received a few through a "Ranchero." Before it falls, it appears as a tri-partite fruit, twelve to fifteen millimetres in diameter, which, viewed from above, presents a sub-ovate, raised surface, with three stronger incisive lines, alternate with three slighter. This divides into three hard convex seeds, of which the inner surface is flattened. These seeds turn themselves incessantly from one side to the other, most strongly when the sun shines upon them. A careful microscopic examination failed to show any opening. Inside of each seed was a white worm, which entirely filled the cavity, and which shows itself to be a Lepidopterous insect, through its metamorphosis. I enclosed a number of the seeds in a box, and found after a short time, the developed pupa, from which later on a moth was produced. ["This is *Carpocasca saltitans*, Westwood—Grote."] The perfect insect opened at its exclusion, a small aperture on the outer convex side of the seeds. In length it measured one millimetre, and was of a blackish-gray color.

This tree does not bear fruit every year, but then in such quantities that the fallen seeds, through the movements of the internal larvæ, produce a sound like rolling peas. In the present year I found no fruit. The moth seems to deposit her egg on the ovary of the blossoms, and the caterpillar seems to hatch after the formation of the seeds. The flowering time of this tree is in April and May. I shall gather some of the blossoms, as well as specimens of the half and



fully ripe fruit. I have now no specimens of the Moth, but a few of the seeds, which I shall send you. At a future time you will receive specimens of all three together.

CHARLES SARTORIUS.

On ballot, Ferdinand Heüssner, was elected a Resident Member of the Society.

SEPTEMBER 10, 1866.

President FRAZER in the Chair.

Ten members present.

The following donations to the Cabinet were announced :—

A miscellaneous collection of Insects of different Orders, from CHAS. H. HART. Thirty-eight specimens of nineteen species of COLEOPTERA, (*Nosodes serrata*, *Peltis Pippingskældi*, *P. fraterna*, *Amphicyrta chrysomelina*, *Helichus productus*, *Aphodius pardalus*, *Cyclocephala hirta*, *Adelocera sparsa*, *Anchastus cinereipennis*, *Elatér cordifer*, *Polycæon Stoutii*, *P. ovicollis*, *Phlædes diabolicus*, *P. pustulosus*, *Noserus plicatus*, *Aræoschizus costipennis*, *Nyctoporis carinata*, *Pelecyporus Lecontei*, Horn (= *costipennis* || Lec.), *Pægrotus*.) from GEO. H. HORN, M. D.

The following Paper was presented for publication in the Proceedings :—

"On certain Entomological Speculations.—A Review. By A. S. Packard, Jr."

And was referred to a Committee.

OCTOBER 8, 1866.

President FRAZER in the Chair.

Nine members present.

On ballot, Reuben Haines, of Germantown, was elected a Resident Member of the Society.

NOVEMBER 12, 1866.

President FRAZER in the Chair.

Ten members present.

The following donation to the Cabinet was announced :—

Twenty-four specimens of ten species of Coleoptera (*Elaphrus politus*, *Anopthalmus Tellkampfi*, *Tychus longipalpus*, *Ceophyllus monilis*, *Adranes Lecontei*, *Adelops hirtus*, *Atemeles cava*, *Ozyporus femoralis*, *Anthophagus casus*, *Sperchopsis tessellatus*.) from CHARLES SONNE.

Letters were read from the Smithsonian Institution acknowledging the receipt of the publications of the Society.

The following papers were presented for publication in the Proceedings :—

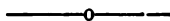
“Description of two new North American Cecidomyiæ. By Baron R. Osten Sacken.”

“Notice of *Thyridopteryx ephemeraeformis*. By Brackenridge Clemens, M. D.”

And were referred to Committees.

The Corresponding Secretary announced the death of Robert Kennicott, a Corresponding Member of the Society.

On ballot, Johnson Pettit, of Canada West, was elected a Corresponding Member of the Society.



DECEMBER 10, 1866.

President FRAZER in the Chair.

Twelve members present.

The Annual Reports of the Recording and Corresponding Secretaries, the Treasurer, the Curator, and the Standing Committees, were read and accepted.

The following donations to the Library were announced :—

The Entomologists' Monthly Magazine, Vol. II, and five numbers of Vol. III, From the *Editors*.

The Practical Entomologist, Vol. I. From the *Publication Committee*.

On ballot, J. Herman Strecker was elected a Resident Member, and Henry Shimer, M. D., of Illinois, and R. McLaughlin, of London, England, were elected Corresponding Members of the Society.

An election was then held for Officers and Standing Committees to serve for the ensuing year.

The following Officers were chosen : *President*, George H. Horn, M. D. *Vice President*, William S. Pine. *Corresponding Secretary*, E. T. Cresson. *Recording Secretary*, J. Frank Knight. *Treasurer*, Jas. W. McAllister. *Curator*, E. T. Cresson.

JANUARY 14, 1867.

President HORN in the Chair.

Twelve members present.

The following donation to the Cabinet was announced:—

Forty-one specimens of fourteen species of COLEOPTERA, (*Eleodes sulcipennis*, *E. consobrina*, *Ceolocnemis obesa*, *C. dilaticollis*, *Cratidus osculans*, *Cononotus sericans*, *Cysteodemus armatus*, *Lytta smaragdula*, *L. vulnerata*, *Tegrodera erosa*, *Archopalus eurystethus*, *Tetraopes mancus*, *T. oregonensis*, *Chrysochus cobaltinus*.) from GEO. H. HORN, M. D.

The following donations to the Library were announced:—

Proceedings of the Essex Institute, Vol. V, No. 2. From the *Institute*.

Tijdschrift voor Entomologie. Achtste jaargang, 1, 2, 3 Aflevering, 1865. From the *Société Entomologique des Pays-bas*.

Particularitez remarquables des Sauterelles qui sont venues en Russie. Extrait de deux lettres écrites à Monsieur l'Abbé de Saint Ussans. Pamphlet 4to. From *Charles H. Hart*.

From *Rathmell Wilson*:—

The British Hemiptera, Vol. I.—Hemiptera-Heteroptera. By Douglas and Scott. London, 1865. 8vo.

Annales de la Société Entomologique de France. 4 sér. Tome 5. Trim. 4, 1865. 8vo.

Iconographie et description de Chenilles et Lépidoptères inédits, par P. Millière. Tome Deuxieme, Livr. 4 et 5.

The following papers were presented for publication in the Proceedings:—

"Notes on the habits of a few Californian Coleoptera. By George H. Horn, M. D."

"Some observations upon *Phodaga alticeps*. By George H. Horn, M. D."

"On *Eusechus lacerta*. By George H. Horn, M. D."

"On *Rhagoderma tuberculata*. By George H. Horn, M. D."

And were referred to Committees.

The following letter, addressed to the Corresponding Secretary, and dated Philadelphia, December 12, 1866, was read:—

*Dear Sir*:—Enclosed you will receive six Consolidated Mortgage Bonds, of the Huntingdon and Broad Top Railroad and Coal Company, of one thousand dollars each, which you will please present in my name to the Entomological Society of Philadelphia at its next meeting, to be held in Trust by the Society as a Publication Fund, the income derived from the same shall be exclusively applied to the publication of the authorized periodical Publication of the Society, which may be issued in octavo form.

Should a change in the investment at any time be deemed advisable, the Society are fully authorized so to do, conditionally, that the reinvestment be

held in Trust for the same purposes and on the same conditions as the original donation.

I believe it was the intention of my late Brother Thomas B. Wilson, to have made a bequest to the Society, but his last illness was so very violent and rapid in its course, as to deprive him of that power; therefore, in making this donation, I do it, not only for the advancement and encouragement of the Society, but to the memory of his greatness and worth. Yours respectfully,

RATHMELL WILSON.

On motion of Mr. Pine, the thanks of the Society were tendered to Rathmell Wilson, Esq., for his generous donation, made this evening, to the Publication Fund.

FEBRUARY 11, 1867.

President HORN in the Chair.

Thirteen members present.

The following donations to the Library were announced :—

The Entomologists' Monthly Magazine for January, 1867. From the *Editors*.  
Proceedings of the Essex Institute for April, May and June, 1866. From the *Institute*.

Lepidopterological Contributions. By Grote and Robinson. From the *Authors*.  
Fourteenth Annual Report of the Trustees of the Public Library of Boston for 1866. From the *Trustees*.

Silliman's American Journal of Science and Arts, for November, 1866, and January, 1867. From the *Conductors*.

On Fossil Neuropterous Insects in North America. By Samuel H. Scudder. From the *Author*.

Oversigt af Norges Echinodermer, ved Dr. M. Sars, 1861. 8vo. From the *Author*.

Entomologiske Undersøgelser, i Aarene 1864 og 1865, af H. Siebke, 1866. 8vo. From the *Author*.

Abhandlungen herausgegeben vom naturwissenschaftlichen Vereine zu Bremen. 1. Bd. 1. Heft. 1866. 8vo. From the *Society*.

Beskrivelse over Lophogaster typicus, af Dr. Michael Sars, 1862. 4to. From the *Author*.

Om *Siphonodentalium vitreum*, en ny slægt og art af dentalidernes familie, af Dr Michael Sars, 1861. 4to. From the *Author*.

Norges ferskvandskrebsdyr forste afsnit Branchiopoda, I. Cladocera ctenopoda (Fam. Sidiidae & Holopedidae), af Georg Ossian Sars, 1865. 4to. From *Dr. Michael Sars*.

A letter was read from Charles L. Flint, Esq., Secretary of the Massachusetts State Board of Agriculture, dated Boston, Feb. 7, 1867, communicating the following resolutions :—

*Resolved*, that in the opinion of the Massachusetts State Board of Agriculture, the ENTOMOLOGICAL SOCIETY OF PHILADELPHIA, by its researches and its publica-

tions, has exhibited a commendable desire to increase the amount of human knowledge.

*Resolved*, that we regard with great favor the endeavors of this Society to disseminate, in an available form, a knowledge of this important branch of Natural History among Farmers and Pomologists, and we especially recommend its publications and its gratuitous labors to the favorable notice of the community.

The Corresponding Secretary announced the death of Dr. Brackenridge Clemens, of Easton, Pa., a Corresponding Member of the Society.

The following Preamble and Resolutions were then adopted:—

*Whereas*, It has pleased God in His omniscient Providence, to remove from earth and friends, BRACKENRIDGE CLEMENS, M. D., of Easton, Pa., a Corresponding Member of this Society, and, as this Society is desirous of testifying its high appreciation of one, who, during his life, had been a devoted student of Entomology, and, whose works are the evidence of the high literary and scientific attainments of the Author, therefore be it

*Resolved*, that the decease of BRACKENRIDGE CLEMENS, M. D., has taken from the Entomological Society of Philadelphia a good and faithful member, whose heart was ever open to the calls of Entomological Science,

*Resolved*, that the Society has lost one, whose ability was great, and the acuteness of whose mind was large, capable of searching to the greatest depths, and bringing therefrom the long sought knowledge.

*Resolved*, that this Society would respectfully express its deep sympathy with the family of the deceased, in this period of deep affliction by which it has been visited.

*Resolved*, that a copy of the above Preamble and Resolutions be forwarded to Mrs. Brackenridge Clemens, by the Secretary.

On motion of Augustus R. Grote, the name of the Society was changed to the AMERICAN ENTOMOLOGICAL SOCIETY, and a committee of six—consisting of the five Officers of the Society and Charles H. Hart—was appointed to petition the Court to amend the Charter for change of name.

On motion, a Committee of three—consisting of Charles H. Hart, Samuel Lewis, M. D., and George H. Horn, M. D.,—was appointed to form a Constitution and revise the By-Laws of the Society.

On ballot, William Ridings and H. Phillips, Jr., were elected Resident Members of the Society.



1. *Antiocephala albolineata*, G. & R. ♂.      4. *Farula obliquata*, G. & R. ♀.  
 2. *Farula obliquata*, G. & R. ♂.      5. *Farula obliquata*, G. & R. ♀.  
 3. *Farula obliquata*, G. & R. ♀.      6. *Prorhina sinuata*, G. & R. ♂.

the following members of the Society of Unitarian Ministers:

Rev. Mr. W. L. G. of the Society of Unitarian Ministers, of the Unitarian Church of Northampton, who was specially recommended by the Unitarian Ministers of the County of Northampton.

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|---|---|
| 1. <i>Aretia nevadensis</i> , G. & R. ♂.        | 4. <i>Parorgyia obliquata</i> , G. & R. ♀.  |
| 2. <i>Parorgyia Clintonii</i> , G. & R. ♂.      | 5. <i>Parorgyia parallela</i> , G. & R. ♀.  |
| 3. <i>Parorgyia Clintonii</i> , G. & R. ♀.      | 6. <i>Parorgyia cinnamomea</i> , G. & R. ♀. |
| 7. <i>Adelocephala albolineata</i> , G. & R. ♂. |   |





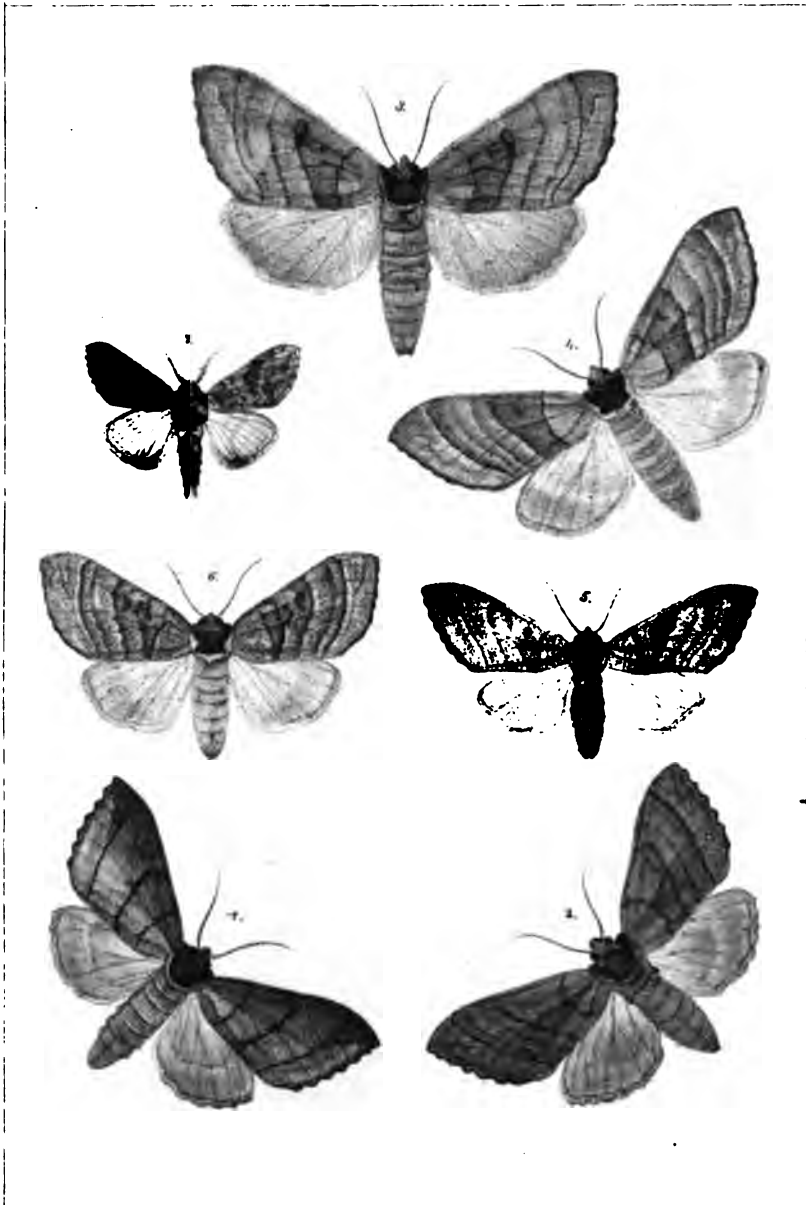


1. *Datana* ... ♀
2. *Datana* ... ♀
3. *Datana major*, ♂ & ♀

4. *Datana integerrima*, ♂ & ♀
5. *Datana contracta*, Walker, ♂
6. *Datana contracta*, Walker, ♀ var.

7. *Celodasys apicalis*, ♂ & ♀.





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|---|---|
| 1. <i>Datana angustii</i> , G. & R. ♀.    | 4. <i>Datana integerrima</i> , G. & R. ♀.   |
| 2. <i>Datana ministra</i> , Walker ♀.     | 5. <i>Datana contracta</i> , Walker, ♂.     |
| 3. <i>Datana major</i> , G. & R. ♀.       | 6. <i>Datana contracta</i> , Walker, ♀ var. |
| 7. <i>Oenodasya apicalis</i> , G. & R. ♂. |   |

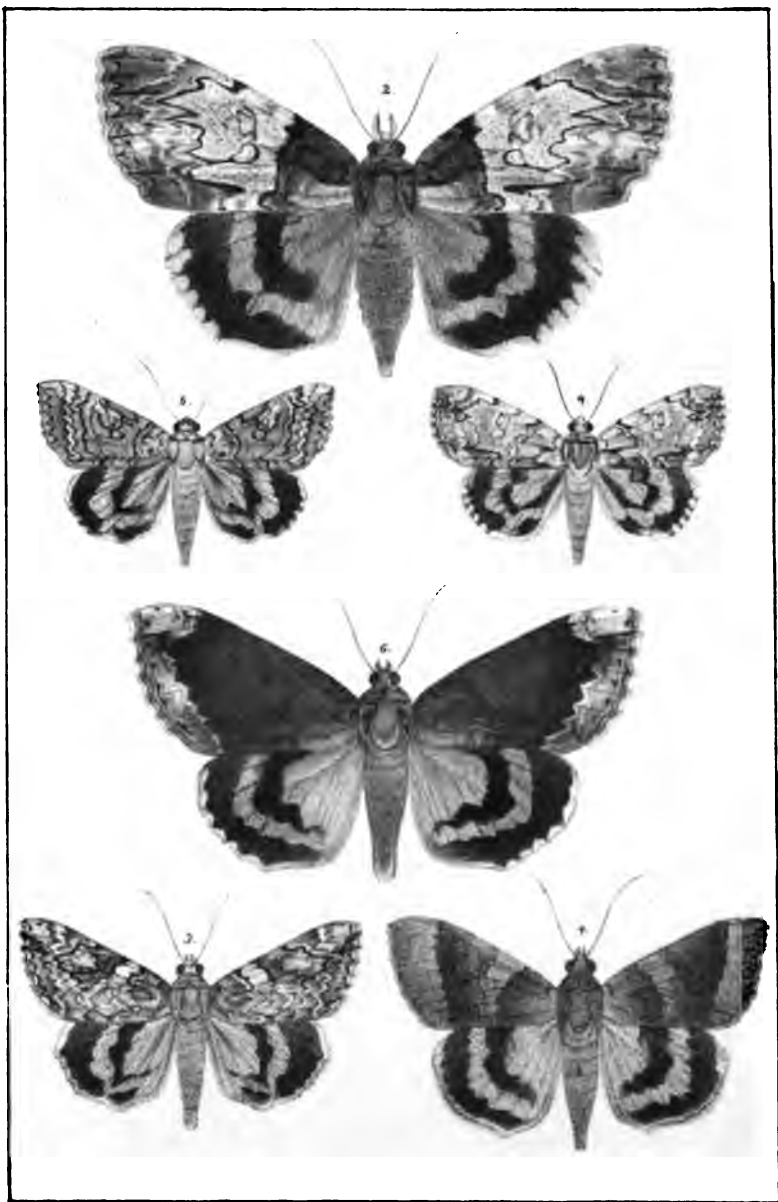
It will be given in next number.



1. *Mamestra bridghamii*, G. & R. ♂.
2. *Xylophasia vulgaris*, G. & R. ♂.
3. *Anthracia hirtella*, G. & R. ♂.
4. *Aedia nigrescens*, G. & R. ♀.

5. *Aedia pallescens*, G. & R. ♀.
6. *Larentia geminata*, G. & R. ♂.
7. *Heliomata cycladata*, G. & R. ♀.
8. *Acronycta funeralis*, G. & R. ♂.



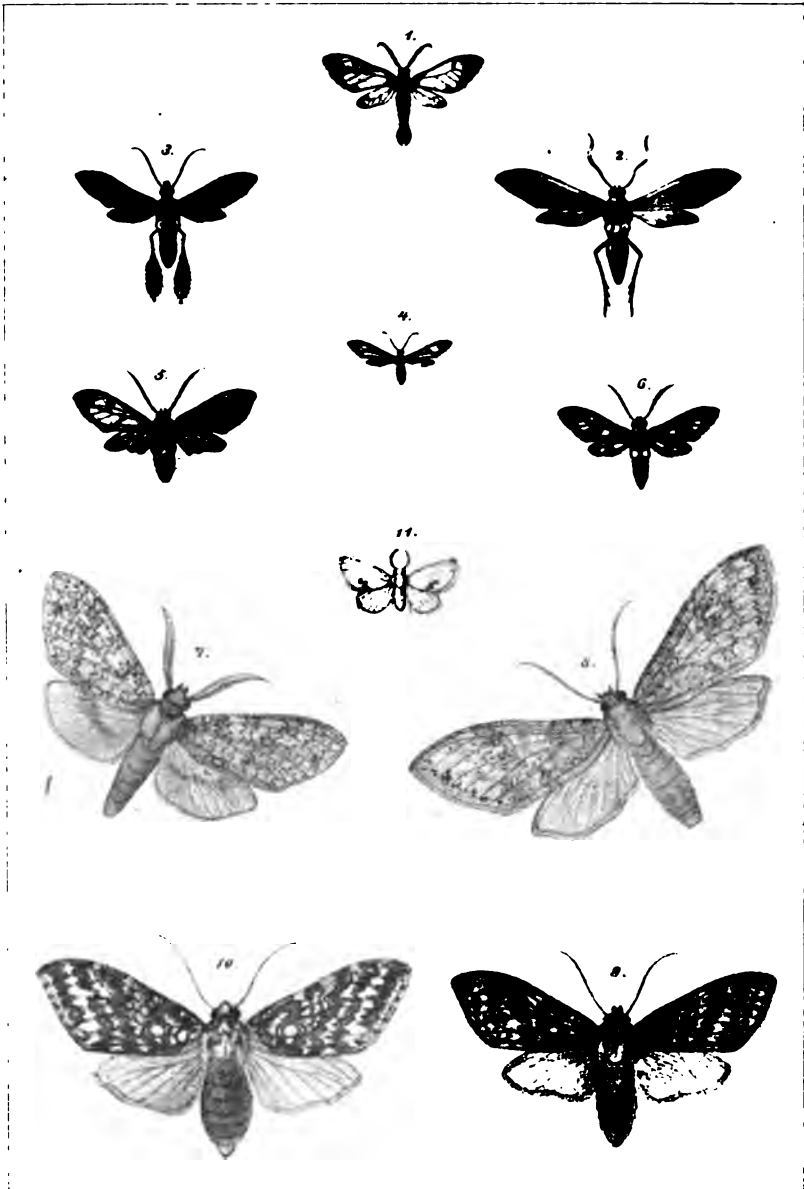


1. *Catocala badia*, G. & R. ♂.
2. *Catocala ponderosa*, G. & R. ♀.
3. *Catocala fratercula*, G. & R. ♂.

4. *Catocala praeclara*, G. & R. ♂.
5. *Catocala formula*, G. & R. ♂.
6. *Catocala scintillans*, G. & R. ♂.







1. *Burtia rubella*, Grote. ♂.
2. *Hiorama diffusa*, Grote. ♂.
3. *Callicarus pennipes*, Grote. ♂.
4. *Formiculus pygmaeus*, Grote. ♀.
5. *Eunomia insularis*, Grote. ♀.
6. *Hippola minima*, Grote. ♂.
7. *Euhalisidota fasciata*, Grote. ♂.
8. *Euhalisidota fasciata*, Grote. ♀.
9. *Euhalisidota scripta*, Grote. ♀.
10. *Euhalisidota alternata*, Grote. ♀.
11. *Euproctis pygmaea*, Grote. ♂.

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Date Due

SEP 22 '66

